

6. NATURE AND EXTENT OF CONTAMINATION

The sample collection methodology, number and depth of samples collected, and laboratory analyses performed on the samples are presented in Section 4. To assess the nature and extent of contamination at the site, the analytical results of various media-specific sampling are evaluated and interpreted in terms of concentration and spatial distribution. The media-specific evaluation of nature and extent of contamination, including results of all previous investigations, are presented in this section. Information presented in this section is from the following sources:

1. Results of previous investigations – Technical Information Package (OHM/IT 2000)
2. Results of the RSE field investigation

The physical characteristics including surface features, site geology and hydrogeology presented in Section 5, provide the context for discussing the nature and extent of debris at the site. As presented previously, the site was historically used as a source of borrow material. Records indicate that some of the borrow pits and trenches were backfilled with construction debris and later covered with 5 feet or more of fill soil (IT/OHM 2000). Interviews with former Station personnel indicate that construction debris generated during the construction of the IDW management area at IRP Site 3 was placed at AA 3. A review of topographical maps and the development of cross sections were conducted as part of the RSE work plan to estimate the lateral extent and depth of debris placement area.

This exercise presumed that the entire difference (vertical depth) in ground surface elevation between the pre- and post-waste placement topographs was backfilled with construction debris. The estimated boundary limits was refined and confirmed as part of the RSE field exploratory trenching.

Since the spatial chemical character of the debris that was placed at the site was not adequately characterized, samples were collected during RSE investigation from the following media:

Air – To evaluate emissions from within the debris placement boundary

Soil (during soil gas survey) – For human health and ERA purposes

Soil gas from within the debris placement limits (soil gas survey) and along the perimeter of the debris (gas wells) – To characterize debris and evaluate landfill gas emissions

Groundwater – To evaluate potential impact to groundwater due to leachate from the debris

Sediment – To evaluate potential impact to the sediments of Agua Chinon Wash due to the debris that were placed at AA 3

Surface water – To evaluate potential impact to the surface waters of Agua Chinon Wash due to the debris that were placed at AA 3

6.1 PHYSICAL EXTENT OF DEBRIS PLACEMENT AREA

The decision rule #1 of the RSE investigation indicated that if the debris placement boundary had not been adequately delineated previously, then additional trenching would be performed to define the debris placement boundaries.

The trenching activity was performed in March 2000 to confirm the results of the geophysical investigation and was not primarily conducted to delineate the extent of debris, even though few

5' but 5' Del
trenches delineated the lateral boundaries. The physical characterization of the debris was performed to a depth of approximately 22 feet bgs during the previous investigation. The debris profile from these 18 trenches is presented in Table 3-3. The debris encountered include concrete, rubble, rebar, metallic debris, wood, plastic and asbestos pipes. Only one trench (H4—central portion of the site at a depth of 7 feet bgs) out of 18 trenches had domestic refuse, such as milk containers. Domestic refuse was not encountered in any other trench. The waste profile of the March 2000 trenches is predominantly inert construction debris.

As part of the RSE investigation, 12 trenches were excavated at the tentative waste placement boundary that was established by using the pre- and post-waste placement topographs (Section 3.6). The estimated depth of exploration and physical characterization was limited to the maximum reach of the backhoe (approximately 12 feet bgs). For exploration methodology and details, refer to Section 4.3. Figure 4-1 presents the trench locations RSE investigation. Table 6-1 summarizes the trench details, including the dimensions and debris profile. The type of debris encountered is similar to the March 2000 trenching debris profile and includes wire, brick chips, asphalt, rebar, concrete rubble and gravel, metal pipes, spent sand bags and hardened gravel-concrete slurry. No domestic refuse was encountered in any of the 12 RSE investigation trenches. Based on the definition of inert waste in the State of California Public Resource Code Section PRC 48007 "*inert waste" means rock, concrete, brick, sand, soil, and cured asphalt only*", the debris encountered in AA3 site trenches would be classified as inert construction debris.

Cross sectional maps developed using historical topographs were updated using data collected during trenching activities and are presented in Figures 6-1, 6-2, and 6-3. The depth of debris encountered in trenches during both the March 2000 and October 2002 trenching activities is also presented graphically on these cross sections, along with the existing soil cover depth. Figure 5-7 presents the site plan showing the locations of these cross sections. The estimated debris placement boundary is revised and presented on Figure 6-4. RSE trenching has confirmed that the initial demarcation of debris placement was fairly accurate, with the exception of one area near the southeast corner of the site where the boundary was revised inward.

6.2 AIR SAMPLING RESULTS

Air sampling was proposed for the site to assess the potential emissions from the surface of the debris and the potential impact of the waste emissions on the surrounding air quality.

The air sampling methodology for the RSE investigation is presented in Section 4.5. Two types of air sampling were performed at AA 3. Sixteen ambient and integrated samples were collected during the RSE investigations, 7 ambient air samples (including 1 duplicate) and 9 integrated air samples (including 1 duplicate). The complete data sets for ambient and integrated air sampling are presented in Tables D-2 and D-4 of Appendix D.

6.2.1 Ambient Air Sampling

Ambient air samples were collected at three locations, designated A-1 through A-3 (Figure 4-2). Based on the wind directions recorded during the day, location A-1 was designated as the upwind location, while location A-3 was designated as the upwind location during the night. The wind rose diagram for the month of October 2002 is presented in Figure 4-2. Two sets of ambient air samples were collected from each location (12-hour sample collection each time, for a total of 24 hours).

Table 6-2 and Figure 6-5 present the summary of detected analytes. Data published by CARB for statewide landfill testing include median and maximum concentrations for 10 VOCs (1,1,1-trichloroethane, perchloroethylene, methylene chloride, benzene, trichloroethylene, carbon tetrachloride, chloroform, ethylene dichloride, vinyl chloride, ethylene dibromide) required by California law (CARB 1990). This data is based on results of landfill testing from 288 landfills at

Table 6-1: Details of October 2002 Trench Exploration – RSE Investigation

Trench number	Date of Trenching	Description	First Horizontal Contact with Debris from End A (feet)	First Vertical Contact with Debris (feet bgs)	Materials Found
TR01-A-A'	10/22/2002	Total Depth – 12 feet bgs Total Length – 150 feet	25 feet toward center of site from End A	2 feet bgs	Traces of wire, brick chips and asphalt from 2 to 4 feet bgs; No debris encountered from 4 feet to 12 feet bgs. No odors recorded.
TR02-A-A'	10/21/2002	Total Depth – 10 feet bgs Total Length – 150 feet	No debris encountered up to 150 feet toward the center of site from End A	No debris encountered upto the maximum reach of the backhoe (10 feet bgs)	— No odors recorded.
TR03-A-A'	10/21/2002	Total Depth – 7 feet bgs Total Length – 45 feet	15 feet toward center of site from End A	4 feet bgs	Concrete rubble with some granodiorite boulders up to 2.5 feet bgs, rebar and metal pipes. No odors recorded.
TR04-A-A'	10/21/2002	Total Depth – 10 feet bgs Total Length – 45 feet	30 feet toward center of site from End A	3 feet bgs	Scattered debris, concrete, and asphalt from 3 to 6 feet bgs; major concrete rubble with some metal, pipes, and asphalt from 6 to 10 feet bgs. No odors recorded.
TR05-A-A'	10/18/2002	Total Depth – 9 feet bgs Total Length – 75 feet	Minor scattered debris till 50 feet toward center of site from End A	0–5 feet bgs	Scattered debris (wire, asphalt, and plastic) from 0 to 5 feet bgs; major construction debris, mostly concrete rubble, asphalt, and concrete gravel slurry from 5 to 9 feet bgs. No odors recorded.
TR06-A-A'	10/08/2002	Total Depth – 8 feet bgs Total Length – 60 feet	Minor scattered debris till 55 feet toward center of site from End A	0–2 feet bgs	Scattered construction debris with concrete asphalt, and PVC tubing from 0 feet to 6 feet bgs; Major debris, mostly concrete rubble, rebar, steel pipes, and asphalt from 6 feet to 8 feet bgs. No odors recorded.
TR07-A-A'	10/18/2002	Total Depth – 11 feet bgs Total Length – 60 feet	5 feet toward center of site from End A	0–2 feet bgs	Gravel and cement slurry; traces of asphalt debris; from 5 to 9 feet bgs construction debris, mostly concrete, fence poles, wire, and plastic. No odors recorded.

Table 6-1: Details of October 2002 Trench Exploration – RSE Investigation

Trench number	Date of Trenching	Description	First Horizontal Contact with Debris from End A (feet)	First Vertical Contact with Debris (feet bgs)	Materials Found
TR08-A-A'	10/17/2002	Total Depth – 10 feet bgs Total Length – 60 feet	45 feet toward center of site from End A	3 feet bgs	Traces of concrete and brick chips; major concrete debris with some asphalt and spent sand bags from 6 to 10 feet bgs. No odors recorded.
TR09-A-A'	10/17/2002	Total Depth – 8 feet bgs Total Length – 45 feet	30 feet toward center of site from End A	3 feet bgs	Concrete and gravel slurry; major concrete debris from 6 to 8 feet bgs. No odors recorded.
TR10-A-A'	10/17/2002	Total Depth – 13 feet bgs Total Length – 70 feet	5 feet toward center of site from End A	5 feet bgs	Scattered cobbles, traces of concrete debris, spent sand bags; major concrete debris with asphalt and some wood from 7 to 10 feet bgs. No odors recorded.
TR11-A-A'	10/22/2002	Total Depth – 8 feet bgs Total Length – 75 feet	5 feet toward center of site from End A	1 feet bgs	Construction debris mostly asphalt, concrete, rebar, bricks, wire and gravel-concrete slurry from 4 bgs to 8 feet bgs. No odors recorded.
TR12-A-A'	10/22/2002	Total Depth – 12 feet bgs Total Length – 150 feet	50 feet toward the center of the site from End A	2 feet bgs	Traces of asphalt, brick debris, and concrete from 2 bgs to 6 feet bgs. No odors recorded.

Table 6-2: Summary of Detected Analytes - Ambient Air Sampling - RSE Investigation

Parameter	CARB Study		Sample ID:	LK001	LK002	LK003	LK004	LK014	LK015	LK016
			Location ID:	AA3-A01	AA3-A02	AA3-A03	AA3-A03	AA3-A01	AA3-A02	AA3-A03
	Median ^a (ppb _v)	Maximum ^a (ppb _v)	Sample Type:	Regular	Regular	Regular	Duplicate	Regular	Regular	Regular
			Sample Date:	10/9/2002	10/9/2002	10/9/2002	10/9/2002	10/9/2002	10/9/2002	10/9/2002
VOCs (EPA Method TO-14)			Units							
2-Butanone (MEK)	NR	NR	ppb _v	3.4 U	3.4 U	3.4 U	6.5	3.4 U	3.6 U	3.6 U
Acetone	NR	NR	ppb _v	5.8	12	5.7	9.6	7.5	6.2	7.8
Ethanol	NR	NR	ppb _v	3.4 U	3.4 U	3.4 U	3.4 U	5.5	4	5.4
Methylene Chloride	1U	1,300	ppb _v	1.3	1.4	1.1	0.9	0.98	1	1
Toluene	NR	NR	ppb _v	0.84 U	0.84 U	0.84 U	0.86 U	0.9	0.93	0.9 U
Fixed Gases (ASTM D-1946)										
Carbon Dioxide	NR	NR	%	0.045	0.047	0.046	0.047	0.044	0.042	0.043
Methane	NR	NR	%	0.00021	0.0002	0.00022	0.00022	0.0002	0.0002	0.0003
Nitrogen	NR	NR	%	78	78	78	78	80	80	80
Oxygen	NR	NR	%	22	22	22	22	20	20	20

NOTES:

ppb_v = parts per billion (volume)

% = percent

VOCs = volatile organic compounds

CARB - California Air Resources Board

NR = not reported in referenced document.

AA3 = Anomaly Area 3

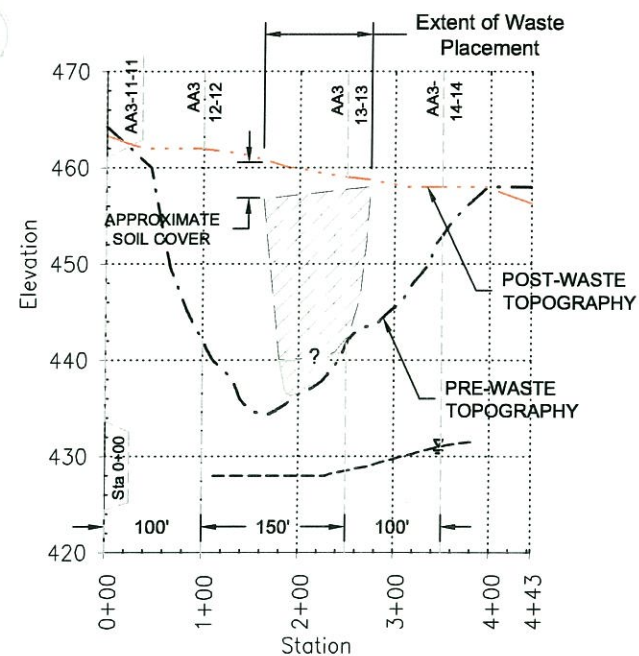
RSE = Removal Site Evaluation

U = indicates the analyte was not detected at or above the stated limit.

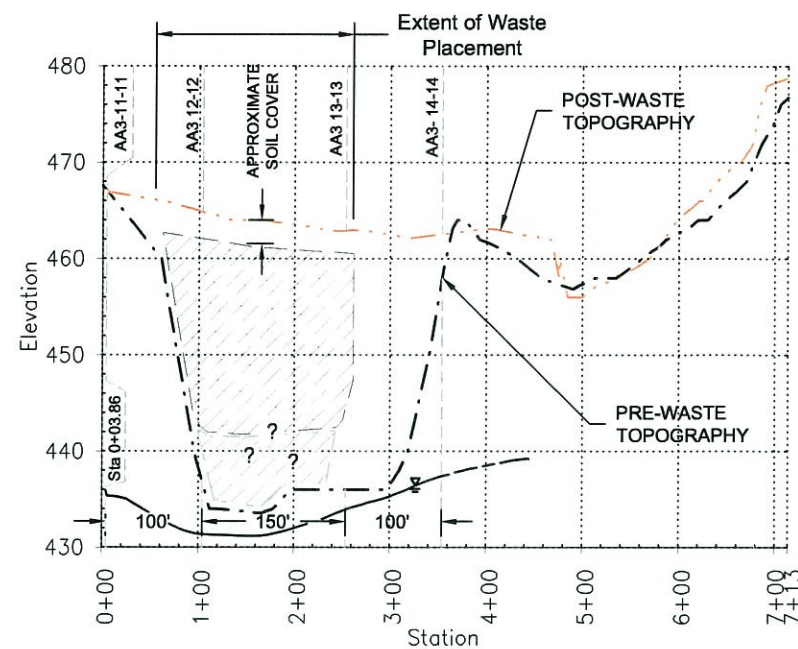
VOC analytes (part of EPA Method TO-14 list) not shown in this table are below their respective reporting limits.

^a Data (median and maximum concentrations) published by CARB for statewide landfill testing for ten VOCs (CARB 1990).

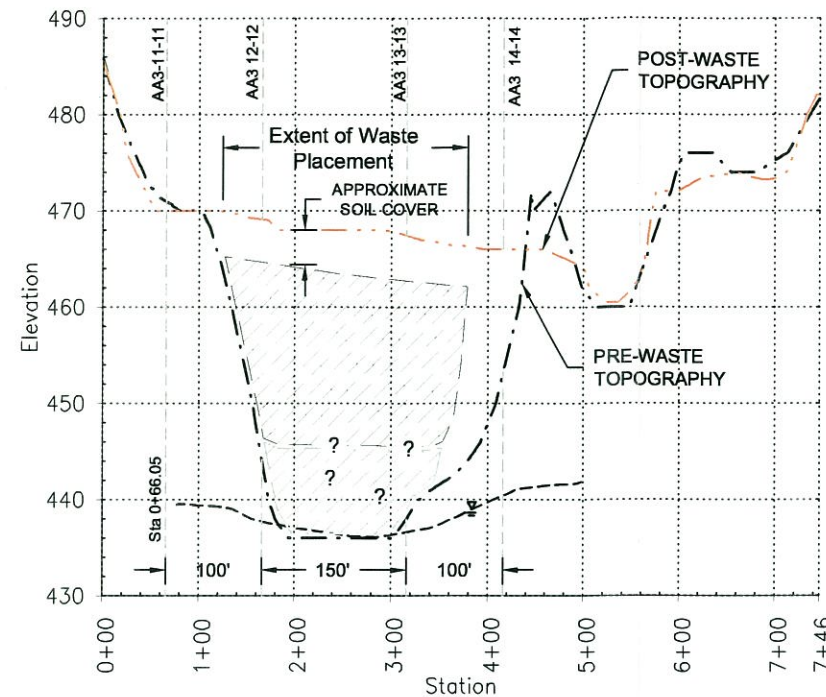
Values in **bold** indicate that the concentrations of that particular analyte has exceeded the median concentrations of the CARB study.



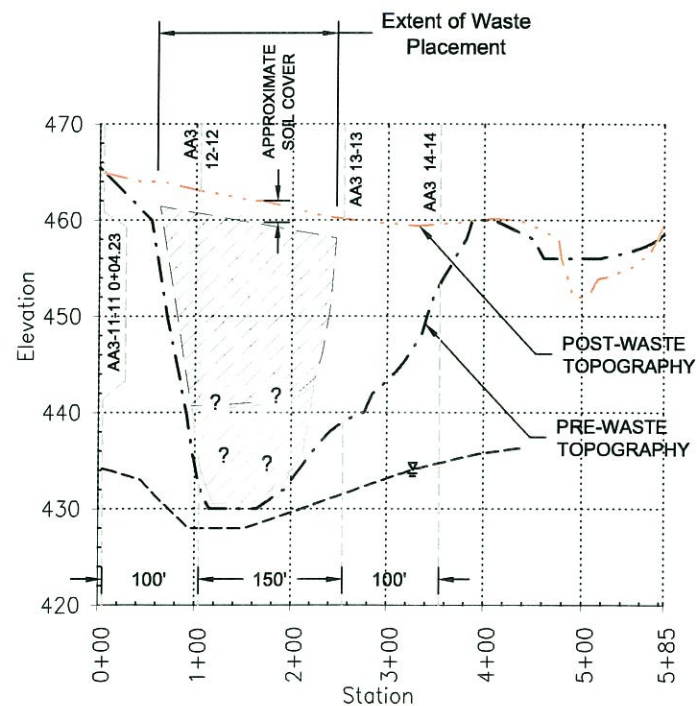
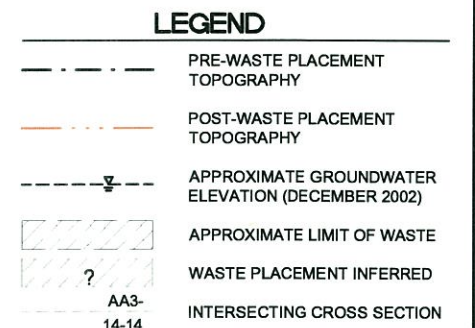
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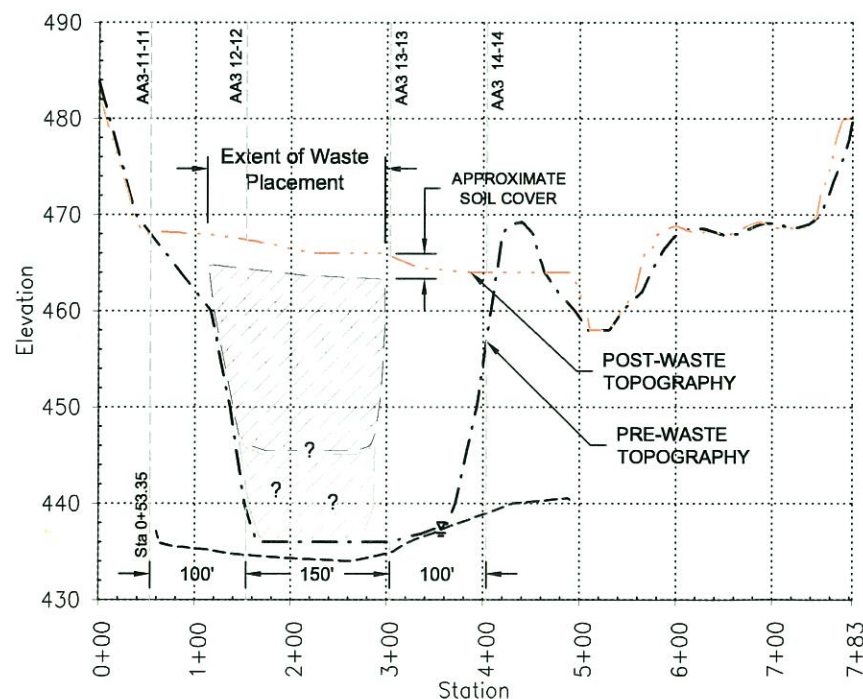
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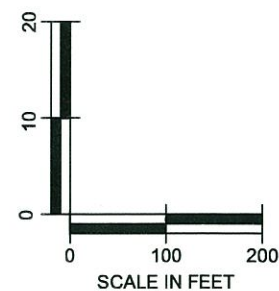
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SCALE: 1"=200' Horizontal
1"=20' Vertical



SECTION AA3--2-2'
SCALE: 1"=200' Horizontal
1"=20' Vertical



SECTION AA3--4-4'
SCALE: 1"=200' Horizontal
1"=20' Vertical



NOTES

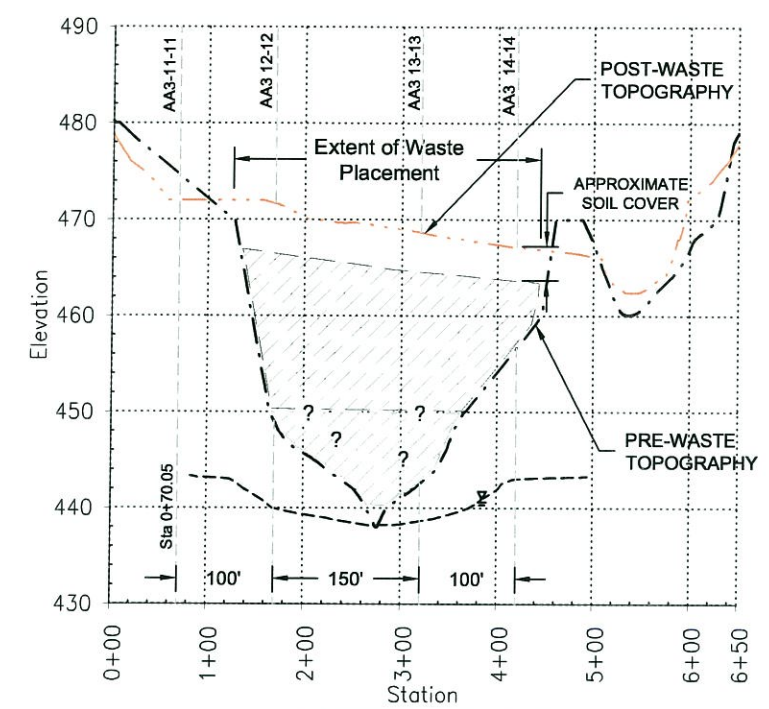
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2. PRE-WASTE PLACEMENT TOPOGRAPHY CIRCA 1972.
3. ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL.
4. APPROXIMATE LIMIT OF WASTE BASED ON MARCH 2000 AND OCTOBER 2002 TRENCH EXPLORATIONS. MAXIMUM DEPTH OF EXPLORATION AS 22 FEET DEEP (MARCH 2000) OR MAXIMUM DEPTH OF EXPLORATION APPROXIMATELY 12 FEET (OCTOBER 2002).

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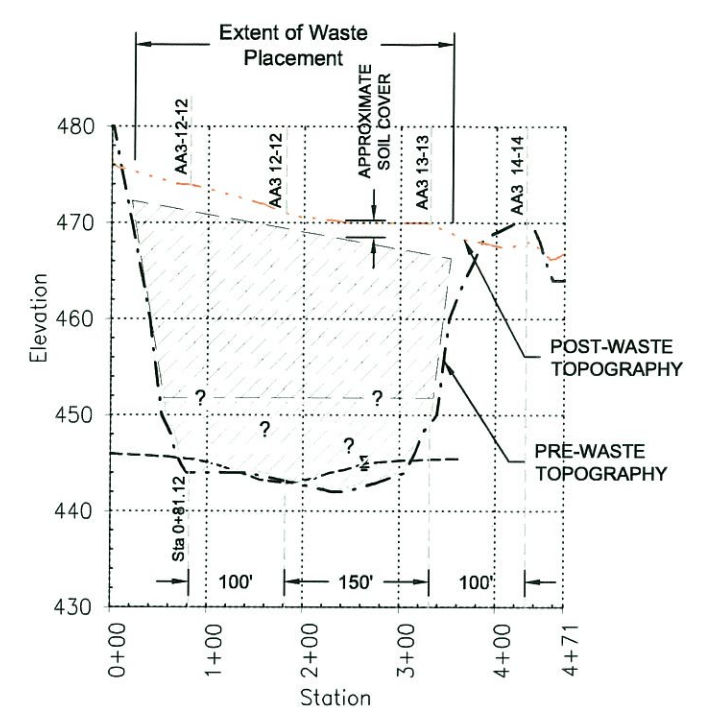
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Revised Cross Sections -- I

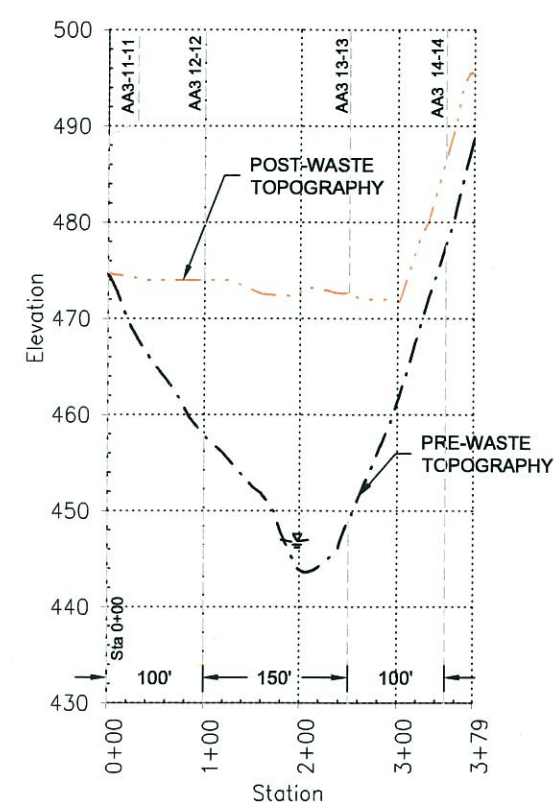
Removal Site Evaluation for Anomaly Area 3		
Date: 11-03	Former MCAS El Toro	
Project No. 37380	EARTH TECH A tyco INTERNATIONAL LTD. COMPANY	
		Figure 6-1



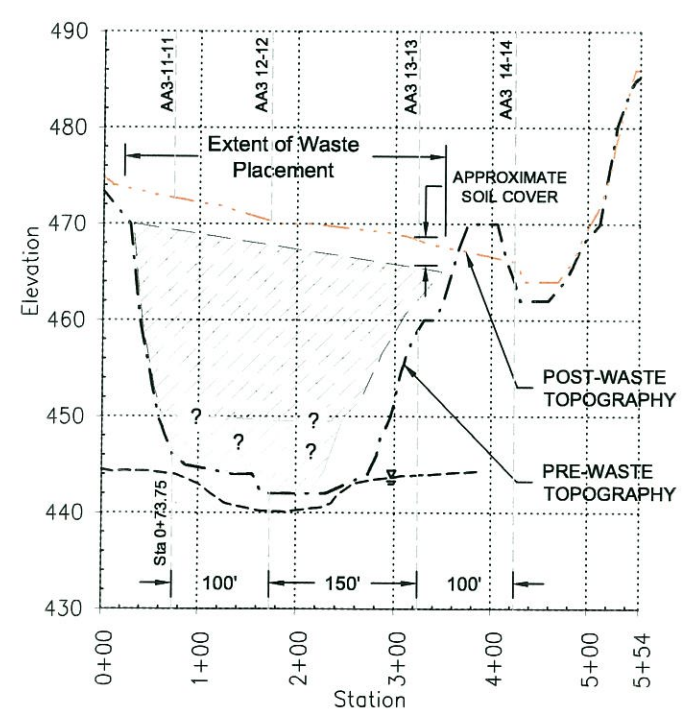
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1"=20' Vertical



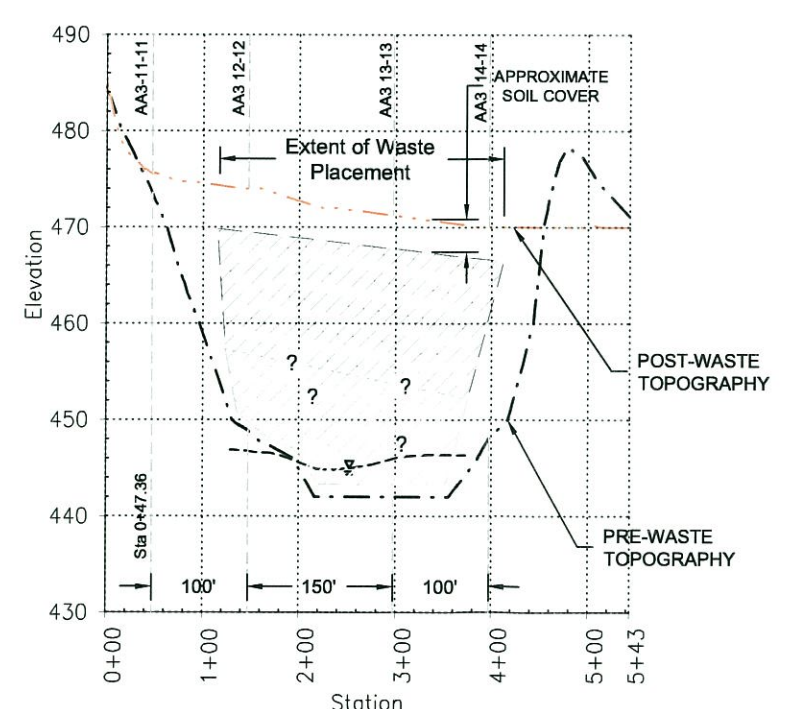
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SCALE: 1"=200' Horizontal
1"=20' Vertical



SECTION AA3--10-10'
SCALE: 1"=200' Horizontal
1"=20' Vertical



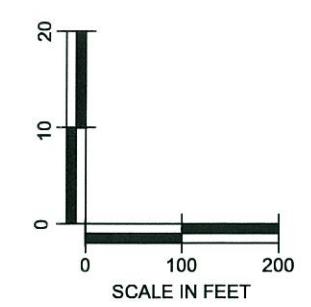
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1"=20' Vertical




SECTION AA3--9-9'
SCALE: 1"=200' Horizontal
1"=20' Vertical

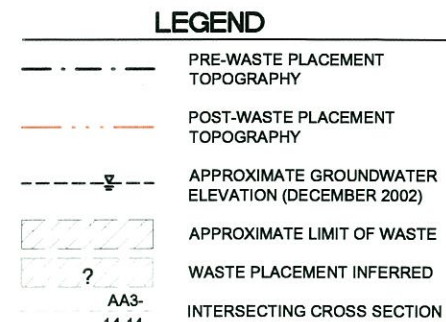
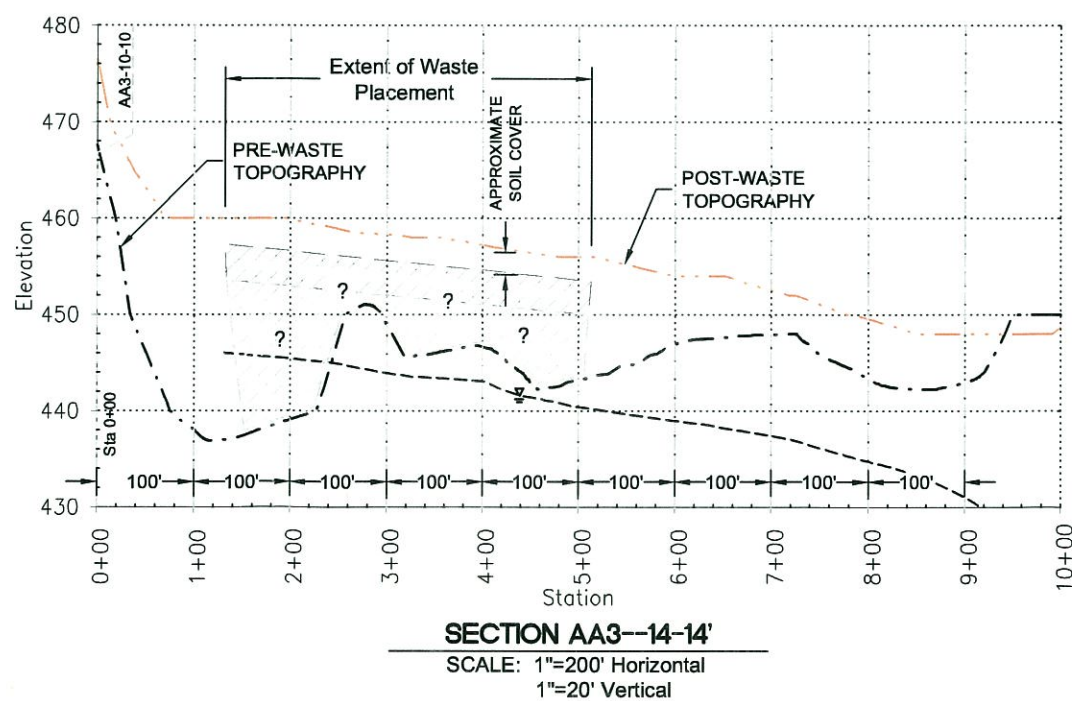
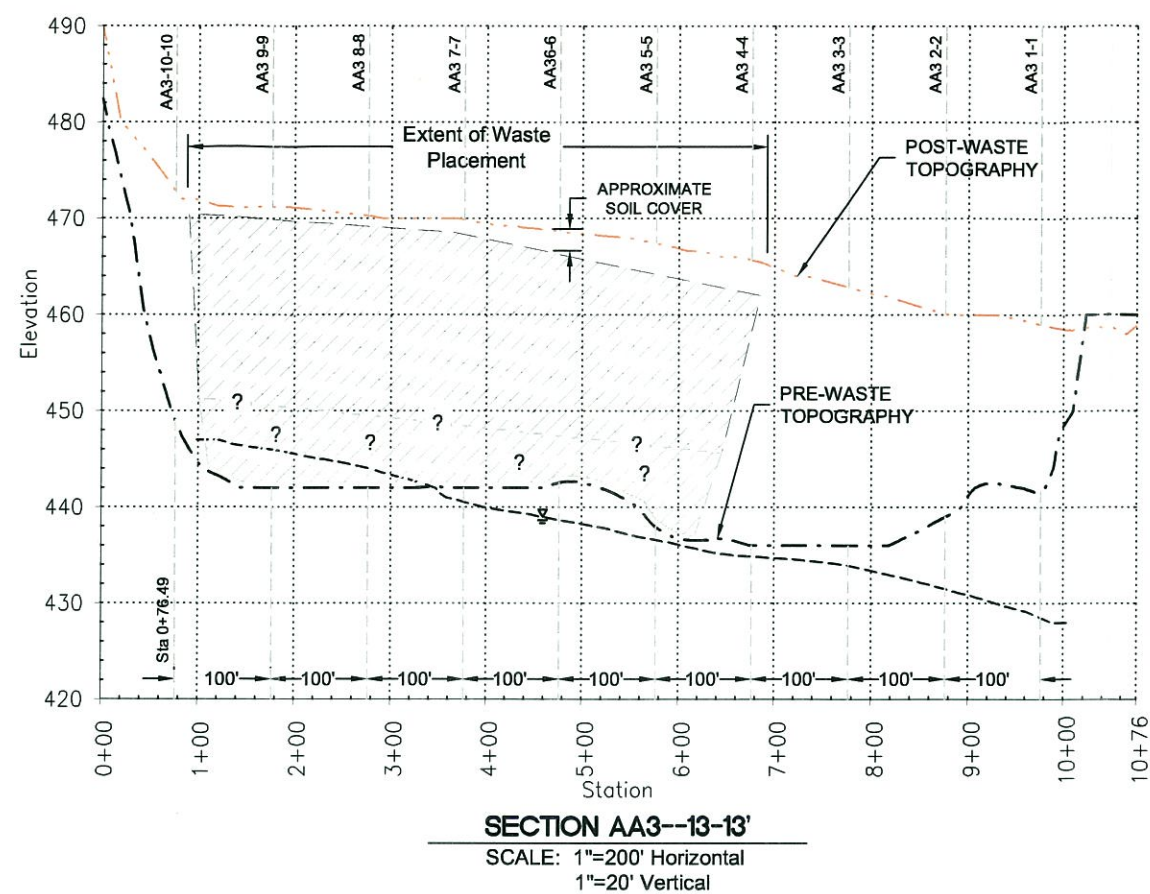
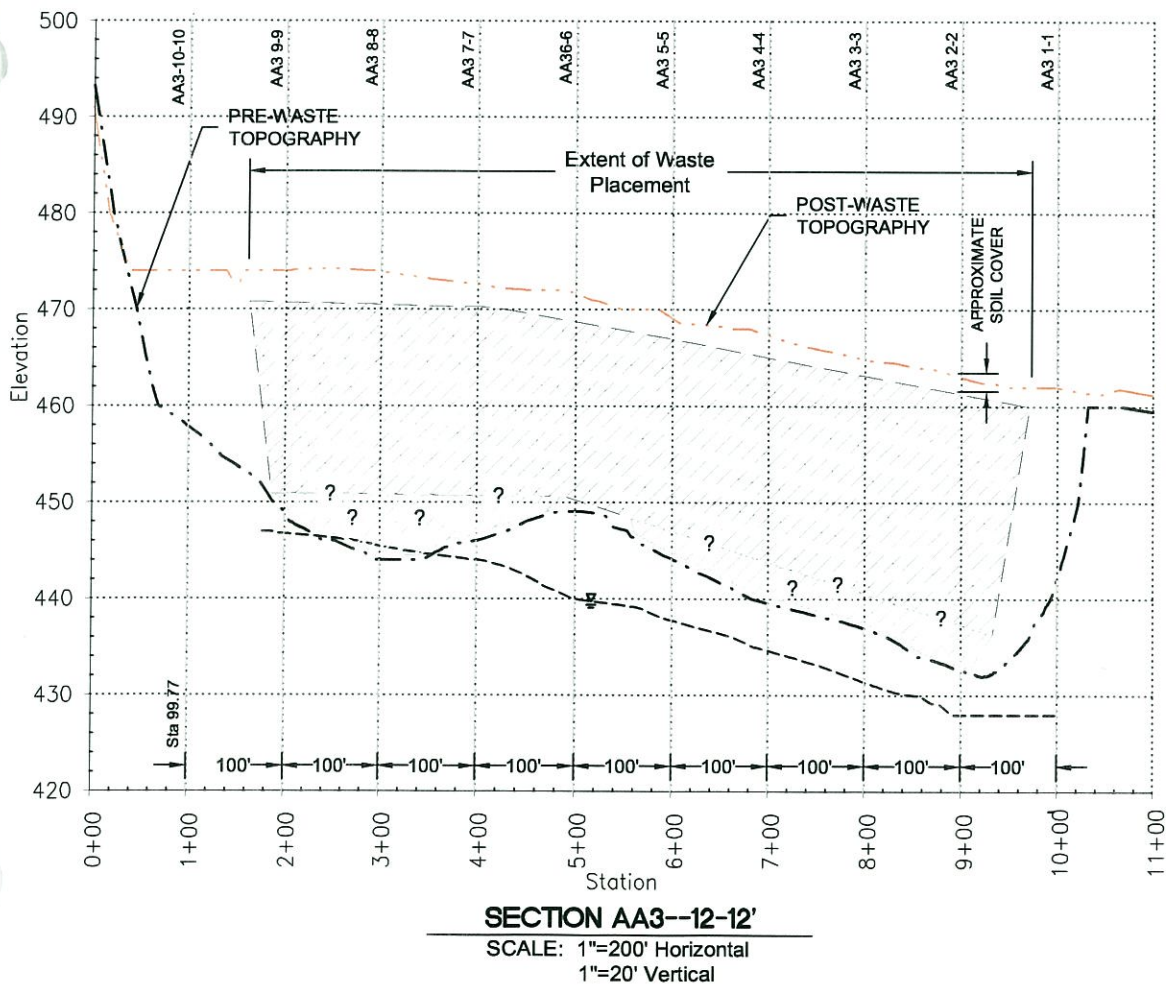
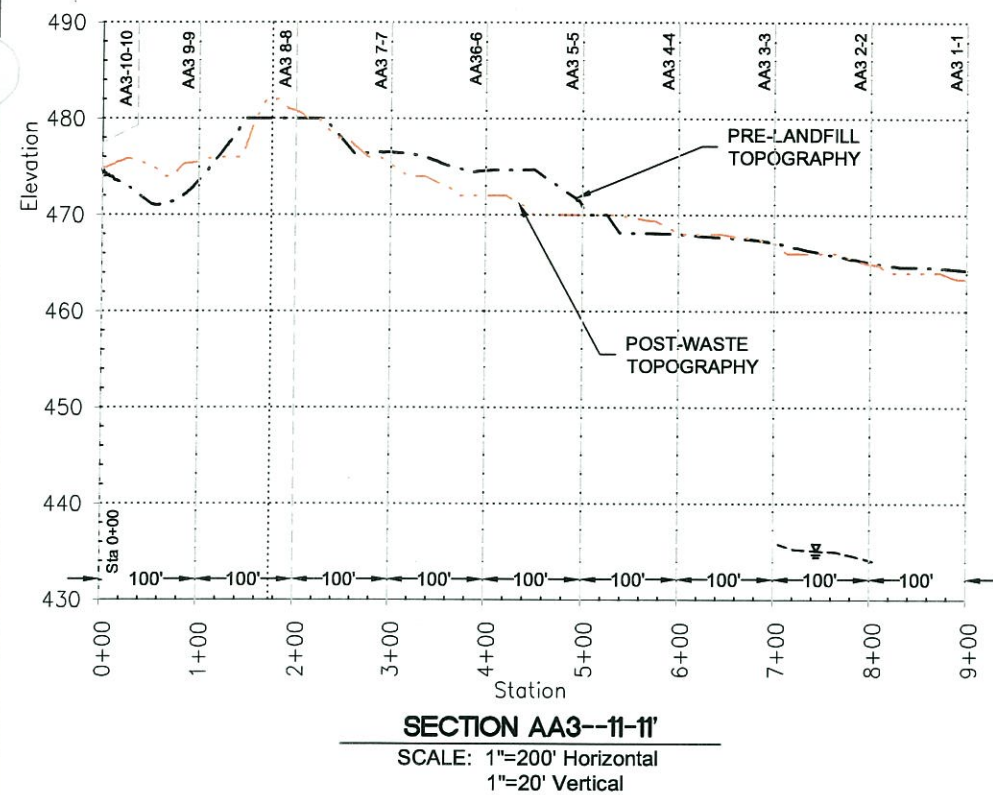
- LEGEND**
- PRE-WASTE PLACEMENT TOPOGRAPHY
 - POST-WASTE PLACEMENT TOPOGRAPHY
 - APPROXIMATE GROUNDWATER ELEVATION (DECEMBER 2002)
 - APPROXIMATE LIMIT OF WASTE
 - WASTE PLACEMENT INFERRED
 - AA3-14-14 INTERSECTING CROSS SECTION

- NOTES:**
1. POST-WASTE PLACEMENT TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHOD FROM AERIAL PHOTOGRAPHY DATED NOVEMBER 8, 1990 BY AIRBORNE SYSTEMS, INC.
 2. PRE-WASTE PLACEMENT TOPOGRAPHY CIRCA 1972.
 3. ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL.
 4. APPROXIMATE LIMIT OF WASTE BASED ON MARCH 2000 AND OCTOBER 2002 TRENCH EXPLORATIONS. MAXIMUM DEPTH OF EXPLORATION AS 22 FEET DEEP (MARCH 2000) OR MAXIMUM DEPTH OF EXPLORATION APPROXIMATELY 12 FEET (OCTOBER 2002).

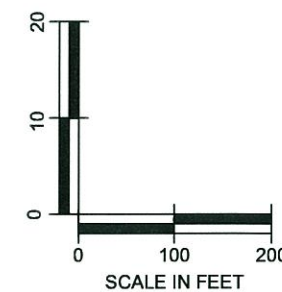



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Revised Cross Sections -- II			
Removal Site Evaluation for Anomaly Area 3			
Date: 11-03	Former MCAS El Toro		Figure 6-2
Project No. 37380	EARTH  TECH A tyco INTERNATIONAL LTD. COMPANY		

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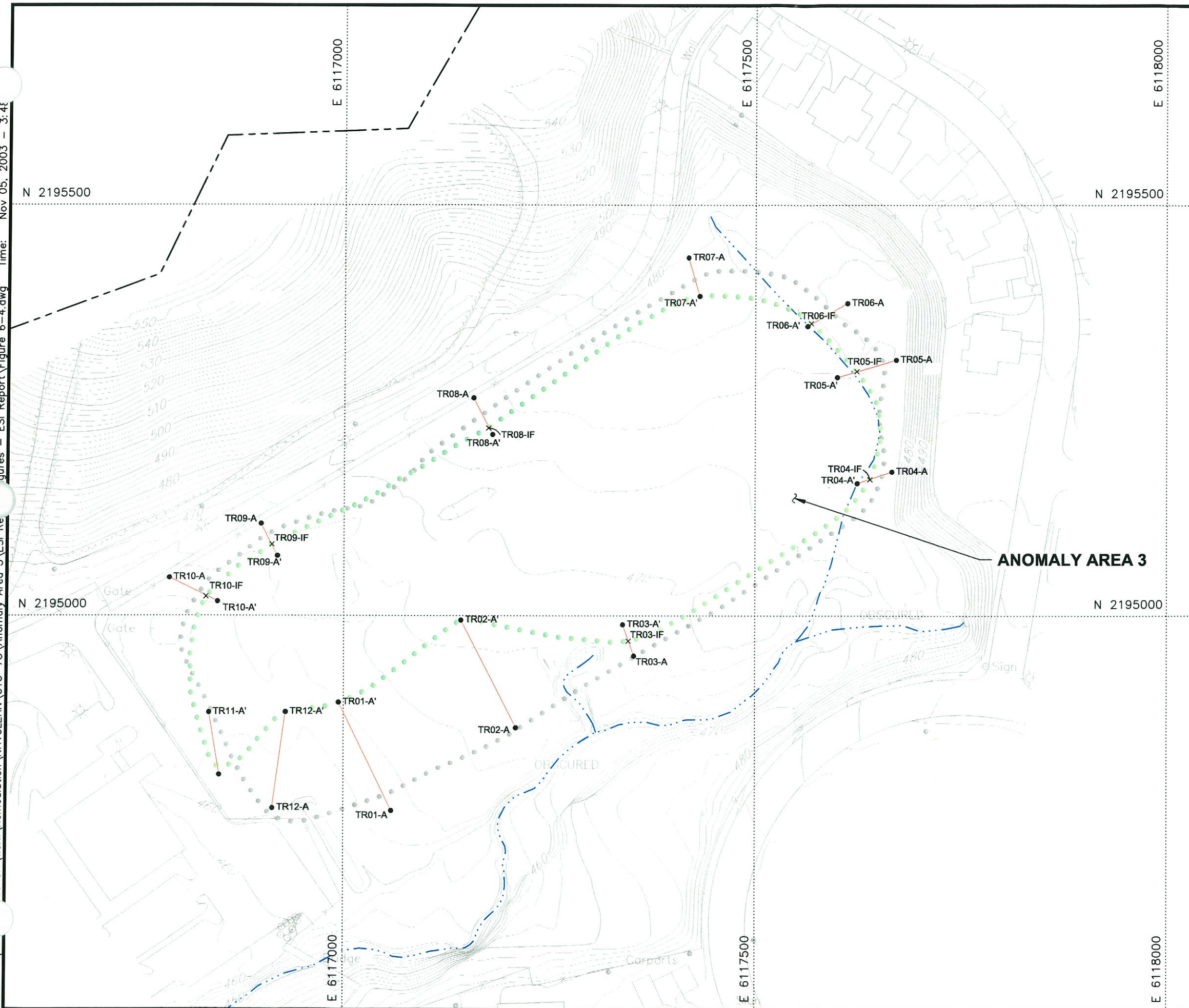


- NOTES:**
1. POST-WASTE PLACEMENT TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHOD FROM AERIAL PHOTOGRAPHY DATED NOVEMBER 8, 1990 BY AIRBORNE SYSTEMS, INC.
 2. PRE-WASTE PLACEMENT TOPOGRAPHY CIRCA 1972.
- ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL.
- APPROXIMATE LIMIT OF WASTE BASED ON MARCH 2000 AND OCTOBER 2002 TRENCH EXPLORATIONS. MAXIMUM DEPTH OF EXPLORATION AS 22 FEET DEEP (MARCH 2000) OR MAXIMUM DEPTH OF EXPLORATION APPROXIMATELY 12 FEET (OCTOBER 2002).



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Revised Cross Sections -- III			
Removal Site Evaluation for Anomaly Area 3			
Date: 11-03	Former MCAS El Toro		Figure 6-3
Project No. 37380	EARTH  TECH		
A tyco INTERNATIONAL LTD. COMPANY			

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LEGEND

- MINOR SURFACE ELEVATION: 2-FOOT INTERVALS
- MAJOR SURFACE ELEVATION: 10-FOOT INTERVALS
- MCAS EL TORO BOUNDARY
- EXISTING STREAM OR WASH
- PREVIOUSLY ESTIMATED EXTENT OF WASTE PLACEMENT BEFORE RSE INVESTIGATION (EARTH TECH 2001)
- REVISED EXTENT OF WASTE PLACEMENT BASED ON TRENCHING (MARCH 2000 AND OCTOBER 2002)
- NEW TRENCH LOCATION AND DESIGNATION
- INTERFACE OF DEBRIS AND FILL SOIL

NOTES

- TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHOD FROM AERIAL PHOTOGRAPHY DATED DECEMBER 2001 BY SAN-LO AERIAL SURVEYS.
- COORDINATES ARE IN CALIFORNIA STATE PLANE COORDINATE SYSTEM, NAD 83, ZONE 6.
- ELEVATIONS IN FEET; BENCHMARK BASED ON NORTH AMERICAN VERTICAL DATUM 1988.

ANOMALY AREA 3



60 0 60 120 FEET
SCALE: 1"=120'

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Revised Extent of Waste Placement

Removal Site Evaluation for Anomaly Area 3

Date: 11-03

MCAS El Toro

Project No.

37380

EARTH TECH

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Figure

6-4

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Location A03 *	Day LK003	Day LK004	Night LK016
2-Butanone	3.4U	6.5	3.6U
Acetone	5.7	9.6	7.8
Ethanol	3.4U	3.4U	5.4
Methylene Chloride	1.1	0.9	1
Methane (ppmv)	2.0	2.0	3.0

Location A01 *	Day LK001	Night LK014
Acetone	5.8	7.5
Ethanol	3.4U	5.5
Methylene Chloride	1.3	0.98
Toluene	0.84U	0.9
Methane (ppmv)	2.1	2.0

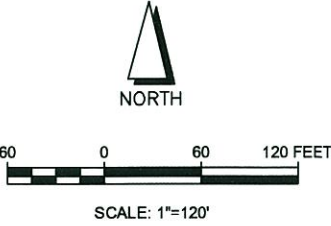
Location A02 *	Day LK002	Night LK015
Acetone	12	6.2
Ethanol	3.4U	4
Methylene Chloride	1.4	1
Toluene	0.84U	0.93
Methane (ppmv)	2.0	2.0

LEGEND

- MINOR SURFACE ELEVATION: 2-FOOT INTERVALS
- MAJOR SURFACE ELEVATION: 10-FOOT INTERVALS
- MCAS EL TORO BOUNDARY
- EXISTING STREAM OR WASH
- PREVIOUSLY ESTIMATED EXTENT OF WASTE PLACEMENT BEFORE RSE INVESTIGATION (EARTH TECH 2001)
- REVISED EXTENT OF WASTE PLACEMENT BASED ON TRENCHING ACTIVITY (MARCH 2000 AND OCTOBER 2002)
- A3 AMBIENT AIR SAMPLING LOCATIONS
- U NOT DETECTED AT THRESHOLD INDICATED
- * CONCENTRATIONS IN TABLES ARE PARTS PER BILLION VOLUME (ppbv), UNLESS OTHERWISE NOTED
- PREDOMINANT DAYTIME WIND DIRECTION DURING FOR THE SAMPLING PERIOD
- PREDOMINANT NIGHTTIME WIND DIRECTION DURING FOR THE SAMPLING PERIOD

NOTES

- TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHOD FROM AERIAL PHOTOGRAPHY DATED DECEMBER 2001 BY SAN-LO AERIAL SURVEYS.
- COORDINATES ARE IN CALIFORNIA STATE PLANE COORDINATE SYSTEM, NAD 83, ZONE 6.
- ELEVATIONS IN FEET; BENCHMARK BASED ON NORTH AMERICAN VERTICAL DATUM 1988.




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Ambient Air Sampling Results -
RSE Investigation

Removal Site Evaluation for Anomaly Area 3

Date: 11-03	MCAS El Toro	Figure 6-5
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which ambient air sampling was performed. Detected ambient air sample results from this RSE investigation were compared to the CARB median and maximum concentrations for ambient air sampling (Table 6-2). Table 6-3 presents the statistics of detected analytes and number of samples exceeding the CARB study median and maximum concentrations.

Table 6-3: Statistics of Detected Analytes – Ambient Air Sampling – RSE Investigation

Analyte	Number of Samples Analyzed ^a	Number of Detections	Minimum and Maximum Concentrations (ppbv)	Frequency of Detection (%)	Detections Above Median Concentrations of CARB Study	Detections Above Maximum Concentrations of CARB Study
UPWIND						
2-Butanone	2	0	—	0	— ^b	— ^b
Acetone	2	2	5.8 and 7.8	100	— ^b	— ^b
Ethanol	2	1	5.4	50	— ^b	— ^b
Methylene chloride	2	2	1.0 and 1.3	100	2	0
Toluene	2	0	—	0	— ^b	— ^b
Methane	2	2	2100 and 3000	100	— ^b	— ^b
DOWNWIND						
2-Butanone	5	1	6.5	20	— ^b	— ^b
Acetone	5	5	5.7 and 12	100	— ^b	— ^b
Ethanol	5	2	4 and 5.5	40	— ^b	— ^b
Methylene chloride	5	5	0.9–1.4	100	5	0
Toluene	5	2	0.9–0.93	40	— ^b	— ^b
Methane	5	5	2000–3000	100	— ^b	— ^b

Notes:

^a Number of samples analyzed for the specified analyte, including duplicates, if any.

^b Not established in the CARB Study (CARB 1990), therefore, no comparison was made.

Composting activities that are conducted northwest of the AA 3 may also influence the ambient air results at the site. The results indicate that there is no significant difference between the upwind and downwind sample results since low levels of the same constituents (acetone, ethanol, methylene chloride, and methane) were detected at approximately the same concentrations at both upwind and downwind locations (Table 6-2). Low concentrations of 2-butanone and toluene were detected only in downwind samples. Methylene chloride was detected in all the upwind and downwind locations at concentrations exceeding only the CARB study median concentrations. Since methylene chloride was detected at 40 percent of the landfills tested and had the highest maximum level concentrations, the CARB study attributed these concentrations to possible contamination from extraneous sources or interference from common laboratory contaminants. The median and maximum concentrations for the other ambient air detected analytes (e.g., methane) were not established in the CARB study. Methane was detected at concentrations ranging from 2 to 3 ppmv.

6.2.2 Integrated Surface Air Sampling Results

Integrated surface sampling was performed in accordance with the SCAQMD guidance for waste sampling (SCAQMD 1989). Integrated surface air samples (IN-1 through IN-8), were collected from Grids #1 through #8 to assess potential emissions of VOCs and methane from the surface of the landfill (Figure 4-2).

All integrated air samples collected were sent to a fixed laboratory for VOC and fixed gas analysis, even though the work plan indicated that only samples that exceeded the field reading of 50 ppmv would be sent to the laboratory for analysis. None of the samples that were field screened exceeded the SCAQMD limit of 50 ppmv for total organic carbon. Methane was detected at concentrations ranging from 2 to 3 ppmv, similar to ambient air concentrations (Section 6.2.1). Table 6-4 and Figure 6-6 present the summarized results of detected analytes for integrated air sampling. Table 6-5 presents the statistics on the detected analytes of integrated air sampling, along with the comparison to CARB study integrated air sampling results.

Detected analytes included low levels of 2-propanol, acetone, benzene, ethanol, m,p-xylenes, methylene chloride, and toluene. Data published by CARB for statewide landfill testing include median and maximum concentrations for methane and 10 VOCs (1,1,1-trichloroethane, perchloroethylene, methylene chloride, benzene, trichloroethylene, carbon tetrachloride, chloroform, ethylene dichloride, vinyl chloride, ethylene dibromide) required by California law (CARB 1990). These data are based on results of landfill testing from 251 landfills at which integrated air sampling was performed. Integrated samples from these landfills were analyzed for methane and 10 specified VOC contaminants. Detected sample results from this investigation were compared to the CARB median and maximum concentrations for integrated sampling (Table 6-4). Benzene, methylene chloride, and methane exceeded the median concentrations in 100 percent, 78 percent, and 63 percent of the integrated air samples analyzed, respectively; no detected chemicals exceed the CARB maximum concentrations.

6.2.3 Summary of Air Sampling Results

The results presented in Table 6-3 for ambient air samples indicate that both the upwind and downwind locations had 100 percent detections of same analytes (methylene chloride, acetone, and methane). Only downwind samples had low levels of detections of 2-butanone (6.5 part per billion [ppbv]), ethanol (4 and 5.5 ppbv), and toluene (0.9 and 0.93 ppbv). Methylene chloride, acetone and 2-butanone are common laboratory contaminants. Integrated air sampling results presented in Table 6-5 indicate that with the exception of low levels of 2-propanol (6 ppbv), benzene (3.7 to 43 ppbv), and m,p-xylene (1.5 to 2.7 ppbv), the same detected constituents of integrated air samples were also detected in ambient air samples, including methane. In addition, as described below in Section 6.3, no VOCs were detected in any of the soil gas samples collected from within the debris placement boundary. These results show that the integrated air samples are not influenced by debris placed at the site and the results are relatively consistent with the ambient air samples.

6.3 SOIL GAS SAMPLING RESULTS

Figure 4-1 illustrates the soil gas sampling locations arranged in a grid pattern at the centers of thirty-three, 100- by 100-foot grids. Shallow and subsurface soil gas sampling was conducted across AA 3 to characterize soil vapors within the debris placement area, to determine whether soil hot spots are present, and to check for the necessity of a landfill gas collection system for the site. Results from this survey were used in evaluating the nature and extent of contamination in soil gas media, if any, as it related to the DQO decisions #5 and #6.

Chemical characterization of the debris within the waste placement boundary using soil gas collection and analysis was not performed during previous investigations. In order to adequately answer the RSE decision questions, a soil gas survey was conducted at AA 3. Soil gas sampling proceeded at 10-foot intervals starting at 5 feet bgs and continued until the soil gas sample collected at preceding depth had no VOC detection (based on mobile laboratory results). However, soil gas samples were collected from 15 feet bgs at all locations irrespective of detection at 5 feet depth. The soil vapor samples collected at a depth of 5 feet were designated as shallow soil vapor samples and

Table 6-4: Summary of Detected Analytes - Integrated Air Sampling - RSE Investigation

Parameter	CARB Study		Sample ID:	LK005	LK006	LK007	LK008	LK009	LK010	LK011	LK012	LK013
	Median ^a (ppb _v)	Maximum ^a (ppb _v)	Location ID:	AA3-ING01	AA3-ING02	AA3-ING03	AA3-ING04	AA3-ING05	AA3-ING06	AA3-ING07	AA3-ING08	AA3-ING08
			Sample Type:	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Duplicate
			Sample Date:	10/8/2002	10/8/2002	10/9/2002	10/9/2002	10/9/2002	10/9/2002	10/9/2002	10/9/2002	10/9/2002
VOCs (EPA Method TO-14)			Units									
2-Propanol	NR	NR	ppb _v	4.5 U	4.3 U	3.8 U	4.7 U	4 U	4.2 U	4.2 U	4.3 U	6
Acetone	NR	NR	ppb _v	16	13	5.3	6.4	8.8	13	10	9.4	10
Benzene	2U	120	ppb _v	6	6.4	3.7	7	15	43	42	33	25
Ethanol	NR	NR	ppb _v	5.1	6.6	3.8 U	6.6	4.5	7.1	6.2	5.4	12
m,p-Xylene	NR	NR	ppb _v	2.7	1.5	0.96 U	1.2 U	1.8	2.4	1.7	1.6	1.9
Methylene Chloride	1U	3,200	ppb _v	1.1	1.3	1.2	1.2 U	1	1.4	1.2	1.4	1.1 U
Toluene	NR	NR	ppb _v	3.6	1.8	0.96 U	1.2 U	2.2	2.7	2.2	1.7	2.5
Fixed Gases (ASTM D-1946)												
Carbon Dioxide	NR	NR	%	0.047	0.046	0.044	0.045	0.048	0.045	0.044	NA	0.042
Methane	-	-	%	0.0003	0.00022 U	0.00025	0.00024 U	0.0002 U	0.00021 U	0.0002	NA	0.00024
	2.6	130,000	ppb _v	3000	2200 U	2500	2400 U	2000	2100 U	2200	NA	2400
Nitrogen	NR	NR	%	78	78	79	79	79	78	78	NA	80
Oxygen	NR	NR	%	22	22	21	21	21	22	22	NA	20

NOTES:

ppb_v = parts per billion (volume)

% = percent

VOCs = volatile organic compounds

CARB = California Air Resources Board

NR = not reported in referenced document.

AA3 = Anomaly Area 3

RSE = Removal Site Evaluation

- = Not applicable

U = indicates the analyte was not detected at or above the stated limit.

NA = Due to laboratory error, the canister containing sample LK012 was inadvertently evacuated prior to final analysis.

VOC analytes (part of EPA Method TO-14 list) not shown in this table are below their respective reporting limits.

^a Data (median and maximum concentrations) published by CARB for statewide landfill testing for ten VOCs and methane (CARB 1990).

Values in bold indicate that the respective analytes have exceeded the CARB study median concentrations for Integrated air sampling.

Table 6-5: Statistics of Detected Analytes – Integrated Air Sampling – RSE Investigation

Analyte	Number of Samples Analyzed ^a	Number of Detections	Minimum and Maximum Concentrations (ppbv)	Frequency of Detection (%)	Detections Above Median Concentrations of CARB Study	Detections Above Maximum Concentrations of CARB Study
2-Propanol	9	1	6	11	- ^b	- ^b
Acetone	9	9	5.3 – 16	100	- ^b	- ^b
Benzene	9	9	3.7 – 43	100	- ^b	- ^b
Ethanol	9	8	4.5 – 12	89	- ^b	- ^b
m,p-xylenes	9	7	1.5 – 2.7	78	- ^b	- ^b
Methylene chloride	9	7	1.0 – 1.4	78	7	0
Toluene	9	7	1.7 – 3.6	78	- ^b	- ^b
Methane	8	5	200 – 300	63	4	0

Notes:

^a Number of samples analyzed for the specified analyte, including duplicates, if any.^b Not established in the CARB Study (CARB 1990), therefore, no comparison was made.

samples collected deeper than 5 feet were designated as subsurface soil gas samples. With the exception of one location (HA011) where a 25-foot deep vapor sample was collected due to the presence of elevated methane at 15 feet, sampling at all other locations terminated at 15 feet bgs. Details of the soil gas survey, including the soil gas survey report, are presented in Appendix E.

Since none of the 76 soil gas samples (centers of 100- by 100-foot grids) exceeded the hot spot VOC threshold concentration of 300 µg/L, no additional sampling locations at centers of a 50- by 50-foot grid were required.

6.3.1 Shallow Soil Gas Sampling Results

Thirty-three samples were collected at depths of 5 feet from the site and analyzed in the field by a mobile analytical laboratory for VOCs (EPA Method 8260). As per the RSE work plan, approximately 10 percent of soil gas samples were to be sent to the laboratory for fixed gas analysis based on the field screening results. Since none of the shallow soil gas results showed indications of methane, none of the samples were sent to the laboratory.

Table E-2 of Appendix E presents the complete data sets for the shallow soil gas samples. Table 6-6 presents the field screening results for shallow soil gas samples. None of the 51 target VOCs and methane (field monitoring data) were detected in any of the shallow soil gas samples. Therefore, it can be concluded that at shallow depths of 5 feet bgs, no hot spots of landfill gases were found that would be indicative of principal threat waste as defined by EPA (1991c).

6.3.2 Subsurface Soil Gas Sampling Results

Forty-two samples collected at a depth of 15 feet (including 9 duplicate samples) plus one 25-foot soil gas sample) were analyzed in the field by a mobile analytical laboratory for VOCs (EPA Method 8260). Per the requirements of the BCT, nine samples, including one duplicate sample were sent to the fixed laboratory for methane analysis using ASTM D-1946, in addition to field screening for fixed gases. The samples selected for laboratory fixed gas analysis were based on the results of the field screening. Table 6-7 presents the field screening results for subsurface soil gas samples and Figure 6-7 presents the spatial distribution of methane in subsurface soil gas (field screening results). Field screening results showed non-detect methane concentrations at 25 of 33 sampling locations, with detected concentrations (in 12 samples at 8 locations) ranging from 6,000 ppmv (HA26 and

HA29) to 230,000 ppmv (HA18). The eight locations with detectable methane concentrations were confined to the central portion of the site, with only three central locations (HA16, HA18, and HA21) exceeding the Title 27 CCR stipulated LEL of 50,000 ppmv for methane (Figure 6-7). These results indicate that subsurface methane is confined to the central portion of the site and is not migrating.

Table E-4 of Appendix E presents the complete data sets for subsurface soil gas samples. Since none of the samples analyzed for 51 VOC analytes had detected concentrations, Table 6-8 presents only the summarized results of the laboratory fixed gas analysis.

The subsurface methane concentrations (laboratory results) ranged from 8.3 ppmv at location HA32 to 130,000 ppmv at location HA21. The field screening results at these locations are 0 ppmv and 133,000 ppmv, respectively. Locations HA14, HA18 and HA21 had methane field screening results exceeding the Title 27 CCR stipulated LEL for methane (5 % or 50,000 ppmv for soil vapor). It should be noted that all the 51 VOC analytes analyzed as part of the EPA Method 8260 analysis for these samples had non-detect concentrations.

Carbon monoxide was detected in one of the nine analyzed samples at a concentration of 20 ppmv (HA07). No gas hot spots (exceeding total VOC threshold concentration of 300 µg/L) were found that would be indicative of principal threat waste defined by EPA (1991c).

6.3.3 Perimeter Soil Gas Sampling

Perimeter soil vapor sampling was conducted to verify whether soil vapor is migrating to and beyond the boundaries of the debris. This perimeter vapor sampling results along with the results of the subsurface soil gas survey within the limits of debris placement area assists in resolving the RSE DQO project decision #6.

Existing vapor wells are single wells screened from 15 to 20 feet bgs (PZ3), 17 to 22 feet bgs (PZ1), and 25 to 30 feet bgs (PZ2). Based on the estimated vertical extent of debris placement area, and for the purposes of discussion, the soil gas results from these existing wells will be evaluated as deep zone soil gas results. Newly installed wells (PG1 through PG3) are triple nested wells screened to coincide with the shallow zone (5 to 7 feet bgs), intermediate zone (14 to 16 feet bgs), and the zone at or near the greatest depth of the debris (20 to 22 feet bgs) at each location. These screened intervals assist in evaluating whether there are soil gas emissions from these zones.

6.3.3.1 ROUND 1

The December 2002 soil gas sampling event represents the first of four quarterly sampling events as proposed in the work plan. Samples were screened for VOC concentrations with a FID and fixed gas monitor, and these field measurements are presented in Table 6-9. Table 2 in Appendix F presents the complete data sets for Round 1 perimeter soil gas samples. Table 6-10 presents the summarized detected results for the Round 1 perimeter soil gas samples collected as part of this RSE investigation. Figure 6-8 shows the spatial extent of perimeter soil gas analyte detections. Table 6-11 presents the statistics of detected analytes in the Round 1 perimeter soil gas samples.

Most of the detected analytes were below 1 µg/L, with the exception of tetrahydrofuran, 2-butanone, and acetone. All the maximum concentrations for the analytes cited above were from samples LK276 and LK277 (duplicate) collected from the intermediate zone (screened from 14 - 16 feet bgs) at well PG3. The tetrahydrofuran and 2-butanone concentrations seem to be contributions from well construction materials used to install the vapor wells. Section 6.3.2 presents the subsurface soil gas sampling (soil gas survey) results from within the debris placement area. None of the subsurface soil gas samples collected as part of the soil gas survey at 15 feet bgs, particularly HA09 and HA13,

located less than 50 feet from vapor well PG3, had detectable concentrations of VOCs or methane. This suggests that the concentrations of these analytes in the intermediate zone at PG3 were not due to contributions from the AA 3 subsurface.

Table 6-6: Summary of Field Screening Results – Shallow Soil Gas (5 feet bgs) Survey – RSE Investigation

Location ID	Sample ID	Sample Date	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Lower Explosive Limit (%)	Flame Ionization Detector Reading (ppm)
HA01	LK018	10/9/2002	0.0	2.6	18.2	0.0	1.2
HA02	LK021	10/9/2002	0.0	3.4	17.1	0.0	5.5
HA03	LK024	10/9/2002	0.0	4.5	16.1	0.0	0.0
HA04	LK027	10/9/2002	0.0	0.0	20.9	0.0	0.0
HA05	LK030	10/9/2002	0.0	0.6	19.7	0.0	0.0
HA06	LK033	10/9/2002	0.0	2.0	18.5	0.0	0.7
HA07	LK036	10/10/2002	0.0	1.3	18.9	0.0	1.8
HA08	LK039	10/10/2002	0.0	1.4	18.4	0.0	0.0
HA09	LK042	10/10/2002	0.0	0.0	20.3	0.0	0.0
HA10	LK048	10/10/2002	0.0	0.9	19.4	0.0	0.0
HA11	LK048	10/10/2002	0.0	1.0	19.4	0.0	0.0
HA12	LK051	10/11/2002	0.0	3.2	16.7	0.0	0.0
HA13	LK054	10/10/2002	0.0	0.9	19.3	0.0	0.0
HA14	LK057	10/11/2002	0.0	0.0	20.6	0.0	0.0
HA15	LK060	10/11/2002	0.0	1.0	19.3	0.0	4.2
HA16	LK063	10/11/2002	0.0	0.4	19.0	0.0	0.0
HA17	LK066	10/11/2002	0.0	0.5	20.1	0.0	0.0
HA18	LK069	10/11/2002	0.0	16.3	2.9	0.0	0.0
HA19	LK072	10/11/2002	0.0	0.8	19.4	0.0	0.0
HA20	LK075	10/14/2002	0.0	2.4	17.3	0.0	1.4
HA21	LK078	10/14/2002	0.0	3.2	13.7	0.0	0.0
HA22	LK081	10/14/2002	0.0	1.9	18.4	0.0	NA
HA23	LK084	10/14/2002	0.0	2.4	18.0	0.0	NA
HA24	LK087	10/14/2002	0.0	0.3	18.6	0.0	0.0
HA25	LK090	10/14/2002	0.0	0.1	20.3	0.0	0.0
HA26	LK093	10/14/2002	0.0	6.8	13.8	0.0	0.9
HA27	LK096	10/14/2002	0.0	8.5	10.9	0.0	0.0
HA28	LK099	10/15/2002	0.0	5.9	13.4	0.0	0.0
HA29	LK102	10/15/2002	0.0	6.3	14.3	0.0	0.0
HA30	LK105	10/15/2002	0.0	5.4	14.8	0.0	0.0
HA31	LK108	10/15/2002	0.0	1.6	15.9	0.0	0.0
HA32	LK111	10/15/2002	0.0	7.9	13.4	0.0	0.5
HA33	LK114	10/15/2002	0.0	4.5	15.7	0.0	0.0

Table 6-7: Summary of Field Screening Results – Subsurface Soil Gas (15 feet bgs) Survey – RSE Investigation

Location ID	Sample ID	Sample Date	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Lower Explosive Limit (%)	Flame Ionization Detector Reading (ppm)
HA01	LK019	10/9/2002	0.0	6.3	14.7	0.0	1.4
HA02	LK022	10/9/2002	0.0	0.3	20.1	0.0	18.2
HA03	LK025	10/9/2002	0.0	11.8	9.7	0.0	20.0
HA04	LK028	10/9/2002	0.0	6.6	13.6	0.0	3.0
HA05	LK031	10/9/2002	0.0	0.9	19.5	0.0	0.0
HA06	LK034	10/9/2002	0.0	4.9	17.0	0.0	0.0
HA07	LK037	10/10/2002	0.0	17.0	2.0	0.0	1.0
HA08	LK040	10/10/2002	0.0	4.3	14.9	0.0	3.1
HA09	LK043	10/10/2002	0.0	1.9	18.5	0.0	0.0
HA10	LK046	10/10/2002	0.0	30.7	2.8	0.0	1,700.0
HA11	LK049	10/10/2002	1.4	27.1	1.8	28.0	>2,000
HA11	LK129	10/10/2002	0.1	1.8	18.7	0.0	350.0
HA12	LK052	10/11/2002	0.0	9.1	5.7	0.0	0.0
HA12	LK121	10/11/2002	0.0	9.1	5.7	0.0	0.0
HA13	LK055	10/10/2002	0.0	9.5	10.9	0.0	0.0
HA13	LK120	10/10/2002	0.0	9.5	10.9	0.0	0.0
HA14	LK058	10/11/2002	15.7	32.0	0.6	316.0	>2,000
HA15	LK061	10/11/2002	0.0	0.0	20.6	0.0	20.0
HA16	LK064	10/11/2002	0.0	7.7	12.5	0.0	2.0
HA17	LK067	10/11/2002	0.0	0.0	20.7	0.0	120.0
HA18	LK070	10/11/2002	23.0	37.8	0.3	460.0	>2,000
HA18	LK122	10/11/2002	23.0	39.8	0.3	460.0	>2,000
HA19	LK073	10/11/2002	0.0	7.5	12.0	0.0	6.9
HA20	LK076	10/14/2002	0.0	3.9	15.3	0.0	13.0
HA21	LK079	10/14/2002	13.3	14.2	0.7	268.0	>2,000
HA22	LK082	10/14/2002	0.0	8.3	0.4	0.0	NA
HA23	LK085	10/14/2002	0.0	9.9	5.6	0.0	NA
HA23	LK123	10/14/2002	0.0	9.9	5.6	0.0	NA
HA24	LK088	10/14/2002	0.0	6.4	11.5	0.0	0.0
HA25	LK091	10/14/2002	1.0	9.4	0.3	20.0	980.0
HA25	LK125	10/14/2002	1.0	4.4	0.3	20.0	980.0
HA26	LK094	10/14/2002	0.6	1.9	0.3	12.0	800.0
HA26	LK138	10/14/2002	0.6	1.9	0.3	12.0	800.0
HA27	LK097	10/14/2002	0.0	4.9	11.1	0.0	1,460.0
HA27	LK124	10/14/2002	0.0	4.9	11.1	0.0	1,460.0
HA28	LK100	10/15/2002	0.0	0.0	19.1	0.0	250.0
HA29	LK029	10/15/2002	0.6	11.6	0.4	12.0	680.0
HA30	LK106	10/15/2002	0.8	5.9	1.9	16.0	>2,000
HA31	LK109	10/15/2002	0.0	11.1	5.3	0.0	0.0
HA31	LK126	10/15/2002	0.0	11.1	5.3	0.0	0.0

Table 6-7: Summary of Field Screening Results – Subsurface Soil Gas (15 feet bgs) Survey – RSE Investigation

Location ID	Sample ID	Sample Date	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Lower Explosive Limit (%)	Flame Ionization Detector Reading (ppm)
HA32	LK112	10/15/2002	0.0	19.9	1.8	0.0	0.0
HA33	LK115	10/15/2002	0.0	8.6	11.3	0.0	7.0
HA33	LK127	10/15/2002	0.0	8.6	11.3	0.0	7.0

All samples collected from the shallow zone (screened from 5 to 7 feet bgs) had less than 1 µg/L of detected VOC concentrations, with the exception of LK275, which had tetrahydrofuran concentrations of 26.98 µg/L. Similarly, all samples collected from the deep zone (screened from 20 to 22 feet bgs) had less than 1 µg/L of detected VOC concentrations, with the exception of LK274, which had tetrahydrofuran concentrations of 12.89 µg/L. With the exception of tetrahydrofuran, 2-butanone, and acetone, there are no other detections of any of the other compounds greater than 1 µg/L in samples collected from shallow, intermediate, and deep zones along the site perimeter. It should be noted that, as described above in Section 6.3.1, no VOCs were detected in any of the shallow soil gas samples collected from within the debris placement boundary. These results indicate that the debris placed at the site is not impacting perimeter soil gas in the shallow zone.

Methane was not detected in any of the 14 samples collected from these wells and analyzed in the laboratory. Title 27 CCR stipulates that methane concentrations migrating from the landfill should not exceed the LEL in air at the site property boundary (LEL for methane – 5 percent by volume or 50,000 ppmv for soil vapor).

Two rounds (4 November 1999 and 24 July 2000) of perimeter soil gas samples were collected from PZ1 through PZ3 as part of previous investigations. The summary of results from previous investigations is presented in Table 3-3 of this report. A few analytes such as ethanol, 2-propanol, hexane, and tetrahydrofuran were not analyzed in the previous investigations. However, all the detected concentrations from previous investigations were less than 1 µg/L, and are consistent with the results of RSE investigation.

6.3.3.2 ROUND 2

Second round of perimeter soil gas sampling was conducted on 20 and 21 March 2003. Fifteen soil gas samples (including three duplicate samples) were collected from twelve perimeter soil gas wells. Samples were screened for VOC concentrations with a FID and fixed gas monitor, and these field measurements are presented in Table 6-12. These soil gas samples were also sent to a fixed laboratory for VOC and fixed gas analysis. Table F-3 in Appendix F presents the complete data set for Round 2 perimeter soil gas samples. Table 6-13 presents the summarized detected results for the Round 2 perimeter soil gas samples. Consistent with Round 1, methane was not detected in any of the Round 2 samples analyzed in the field and was detected in only 1 of the 14 soil gas samples that were analyzed in the laboratory at a very low concentration of 1.9 ppmv. The relatively higher concentrations of VOCs detected in Round 1 were reduced significantly during Round 2 sampling. The maximum concentration of tetrahydrofuran detected in well PG3 reduced from Round 1 (74 µg/L) to Round 2 (3.896 µg/L) soil gas sampling.

6.3.3.3 ROUND 3

None of the Round 3 perimeter soil gas samples were sent to a fixed laboratory since none of the soil gas samples exceeded the 25 ppmv FID field instrument reading. This requirement was stated in

Section A-2.2.3.2 of the RSE work plan. The RSE SAP states that after two rounds of sampling, only those samples with FID readings above 25 ppmv will be sent to a fixed laboratory. Field screening measurements of Round 3 soil gas samples (using a FID and fixed gas monitor) are presented in Table 6-14. Consistent with the previous two Rounds, methane was not detected in any of the Round 3 samples.

6.3.4 Summary of Nature and Extent of Chemical Contamination – Subsurface Soil Gas

None of the 33 shallow soil gas samples collected from within the debris placement boundary, as part of the soil gas survey, had detected concentrations of 51 VOC analytes and methane. Similarly, none of the 43 subsurface soil gas samples (also collected from within the debris placement boundary as part of the soil gas survey) had any detections of 51 VOC analytes. However, the field screening results for the subsurface soil gas samples showed non-detect methane concentrations at 25 of 33 sampling locations, with detected concentrations (at 8 locations) ranging from 6,000 ppmv to 230,000 ppmv. The eight locations with detectable methane concentrations were confined to the central portion of the site, with only three central sampling locations (out of 33 total locations) exceeding the Title 27 CCR stipulated LEL of 50,000 ppmv for methane. No methane was detected in any of the perimeter soil gas wells during three rounds of sampling. The detection of several VOCs in the perimeter soil vapor wells was inconsistent with the non-detect VOC results in all of the shallow and subsurface soil gas samples collected from within the debris placement boundary.

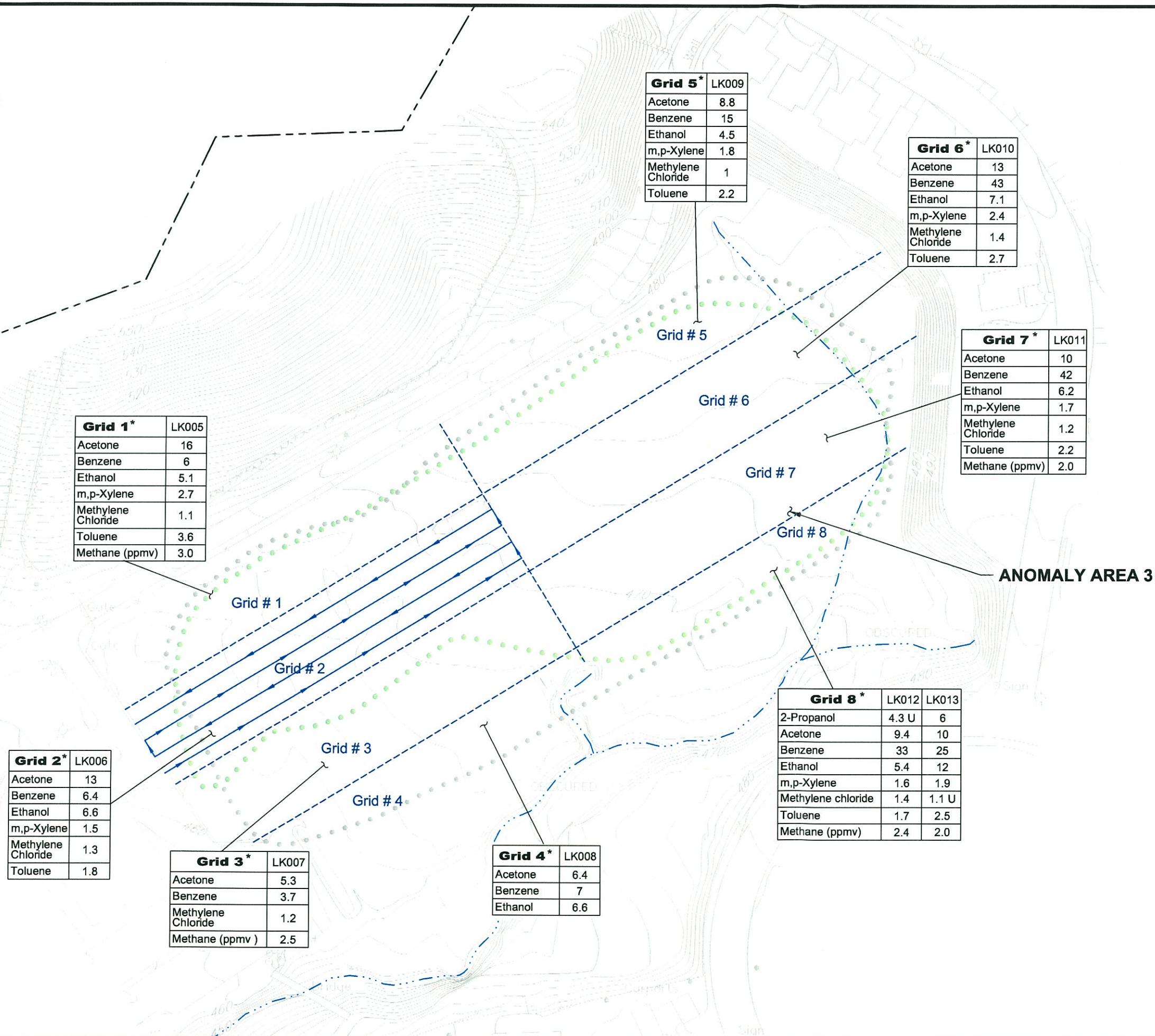
These results support the initial premise that only inert construction related debris were placed at AA 3. The results indicate that subsurface methane is vertically confined to the subsurface (deeper than 5 feet) and laterally confined to the central portion of the debris placement boundary, and is not migrating. The non-detect VOC results in all 76 shallow and subsurface soil gas samples also indicate that the debris placed at AA 3 is not impacting the perimeter soil gas, i.e., there are no VOCs associated with the site. The concentrations, frequency of detection and spatial extent of soil gas constituents indicate that the installation of a landfill gas collection system at AA 3 is not warranted.

6.4 SOIL SAMPLING RESULTS

To support the RSE DQO project decision #3, surface soil samples were collected to evaluate the risk at the site.

For the purposes of RSE investigation, surface soil samples were defined as samples collected from 0 to 1 feet bgs and subsurface soil samples were defined as samples collected from depths greater than 1 foot bgs to maximum depth of debris placement (35 feet bgs). However, for the purposes of evaluating human health risk, surface samples are defined as ranging from 0 to 1 feet bgs and subsurface samples as ranging from depths greater than 1 to 10 feet bgs.

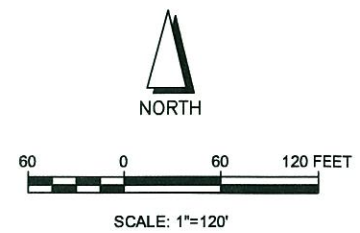
Extensive subsurface soil samples (greater than 1 feet bgs and ranging between 4 to 35 feet bgs) were collected from the exploratory trenches (Section 3.5, and Tables 3-3 and 3-4) during the previous investigation. Therefore, a data set necessary for estimating risk due to subsurface contamination was available. In addition, as part of the RSE investigation, provisions to collect subsurface soil samples were made in the sampling design. It was proposed that subsurface soil samples (8 to 9 feet bgs) would be collected only if the soil vapor sample at the 5-foot depth had detected concentrations of target analytes. In such a case, soil sampling would continue at 10-foot intervals to the base of the fill. Since none of the shallow soil vapor samples from all 33 locations had detected concentrations of target analytes, soil samples from greater depths were not collected.



LEGEND

- MINOR SURFACE ELEVATION: 2-FOOT INTERVALS
- MAJOR SURFACE ELEVATION: 10-FOOT INTERVALS
- MCAS EL TORO BOUNDARY
- EXISTING STREAM OR WASH
- PREVIOUSLY ESTIMATED EXTENT OF WASTE PLACEMENT BEFORE RSE INVESTIGATION (EARTH TECH 2001)
- REVISED EXTENT OF WASTE PLACEMENT BASED ON TRENCHING ACTIVITY (MARCH 2000 AND OCTOBER 2002)
- GRID BOUNDARY
- WALK PATTERN FOR INTEGRATED SAMPLING
- U NOT DETECTED AT THE THRESHOLD INDICATED
- * CONCENTRATIONS IN TABLES ARE PARTS PER BILLION BY VOLUME (ppbv), UNLESS OTHERWISE NOTED
- ppmv CONCENTRATION IN PARTS PER MILLION BY VOLUME

- NOTES**
- TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHOD FROM AERIAL PHOTOGRAPHY DATED DECEMBER 2001 BY SAN-LO AERIAL SURVEYS.
 - COORDINATES ARE IN CALIFORNIA STATE PLANE COORDINATE SYSTEM, NAD 83, ZONE 6.
 - ELEVATIONS IN FEET; BENCHMARK BASED ON NORTH AMERICAN VERTICAL DATUM 1988.

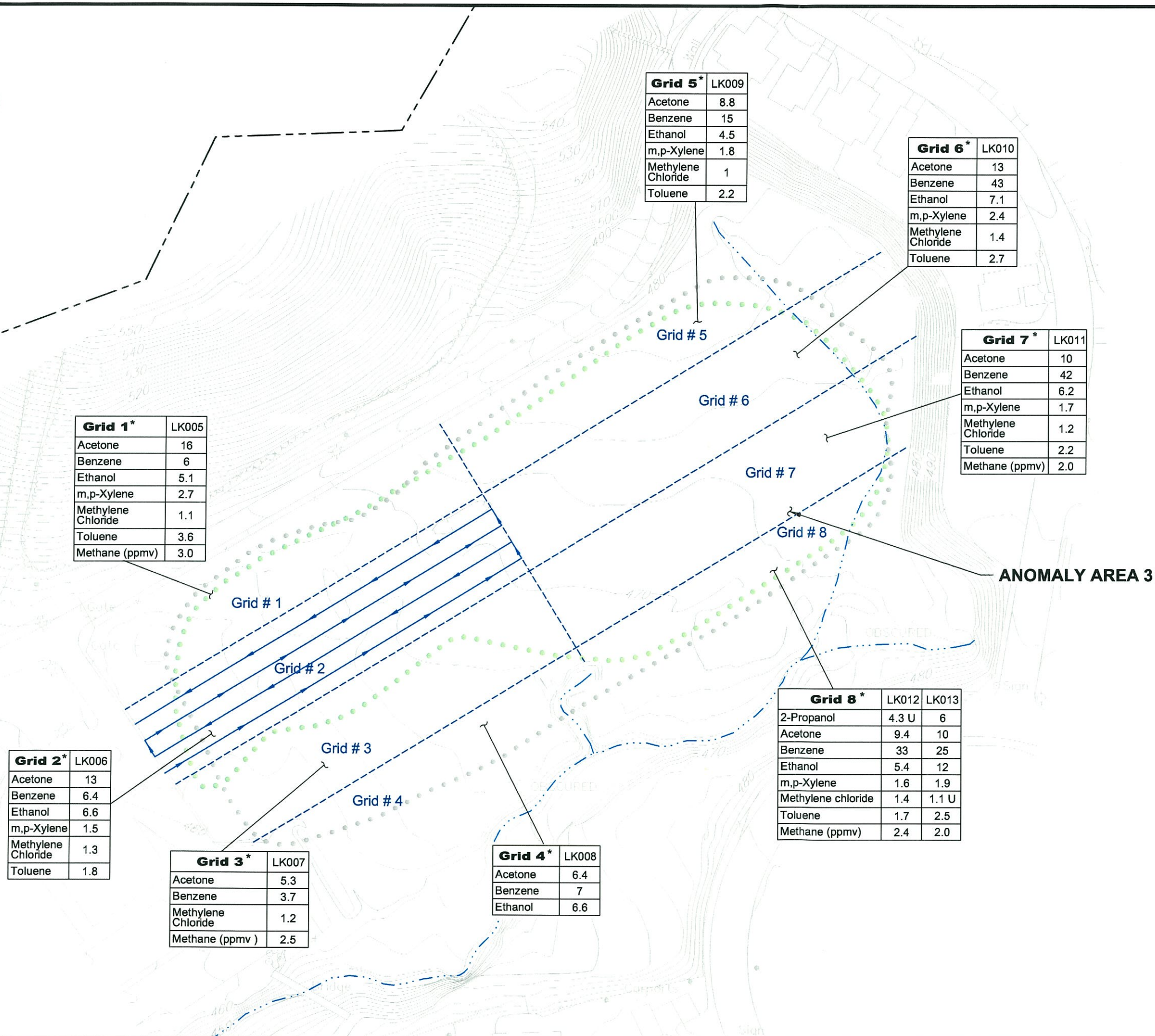


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Integrated Air Sampling Results - RSE Investigation

Removal Site Evaluation for Anomaly Area 3

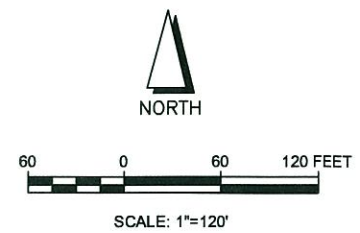
Date: 11-03	MCAS El Toro	Figure 6-6
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LEGEND

- MINOR SURFACE ELEVATION: 2-FOOT INTERVALS
- MAJOR SURFACE ELEVATION: 10-FOOT INTERVALS
- MCAS EL TORO BOUNDARY
- EXISTING STREAM OR WASH
- PREVIOUSLY ESTIMATED EXTENT OF WASTE PLACEMENT BEFORE RSE INVESTIGATION (EARTH TECH 2001)
- REVISED EXTENT OF WASTE PLACEMENT BASED ON TRENCHING ACTIVITY (MARCH 2000 AND OCTOBER 2002)
- GRID BOUNDARY
- WALK PATTERN FOR INTEGRATED SAMPLING
- U NOT DETECTED AT THE THRESHOLD INDICATED
- * CONCENTRATIONS IN TABLES ARE PARTS PER BILLION BY VOLUME (ppbv), UNLESS OTHERWISE NOTED
- ppmv CONCENTRATION IN PARTS PER MILLION BY VOLUME

- NOTES**
- TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHOD FROM AERIAL PHOTOGRAPHY DATED DECEMBER 2001 BY SAN-LO AERIAL SURVEYS.
 - COORDINATES ARE IN CALIFORNIA STATE PLANE COORDINATE SYSTEM, NAD 83, ZONE 6.
 - ELEVATIONS IN FEET; BENCHMARK BASED ON NORTH AMERICAN VERTICAL DATUM 1988.



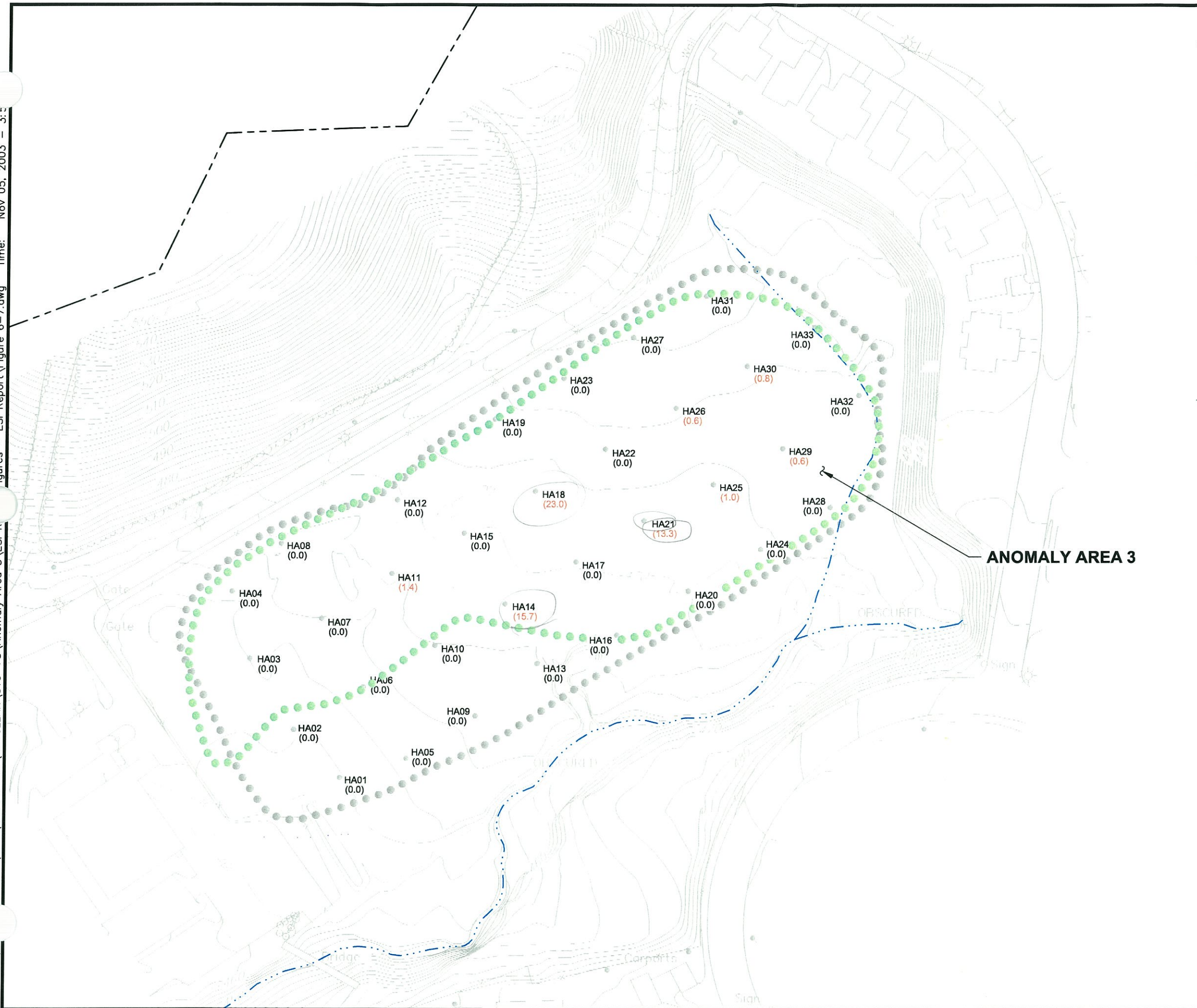
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Integrated Air Sampling Results - RSE Investigation

Removal Site Evaluation for Anomaly Area 3

Date: 11-03	MCAS El Toro	Figure 6-6
Project No. 37380	EARTH TECH A tyco INTERNATIONAL LTD. COMPANY	

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LEGEND

- MINOR SURFACE ELEVATION: 2-FOOT INTERVALS
- MAJOR SURFACE ELEVATION: 10-FOOT INTERVALS
- MCAS EL TORO BOUNDARY
- EXISTING STREAM OR WASH
- PREVIOUSLY ESTIMATED EXTENT OF WASTE PLACEMENT BEFORE RSE INVESTIGATION (EARTH TECH 2001)
- REVISED EXTENT OF WASTE PLACEMENT BASED ON TRENCHING ACTIVITY (MARCH 2000 AND OCTOBER 2002)
- RSE SOIL/SOIL VAPOR SAMPLING LOCATIONS
FIELD SCREENING METHANE READING (PERCENT)

NOTES

- TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHOD FROM AERIAL PHOTOGRAPHY DATED DECEMBER 2001 BY SAN-LO AERIAL SURVEYS.
- COORDINATES ARE IN CALIFORNIA STATE PLANE COORDINATE SYSTEM, NAD 83, ZONE 6.
- ELEVATIONS IN FEET; BENCHMARK BASED ON NORTH AMERICAN VERTICAL DATUM 1988.
- ALL SOIL VAPOR SAMPLES WERE COLLECTED AT A DEPTH OF 15 FEET BELOW GROUND SURFACE. A 25-FOOT SAMPLE WAS COLLECTED AT THE HA25 LOCATION, AND THE FIELD METHANE READING WAS THE SAME AS THE 15-FOOT SAMPLE



60 0 60 120 FEET
SCALE: 1"=120'

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Subsurface Soil Gas Field Screening Results (Methane Only) - RSE Investigation Removal Site Evaluation for Anomaly Area 3			
Date: 11-03	MCAS El Toro		Figure 6-7
Project No. 37380	EARTH  TECH A tyco INTERNATIONAL LTD. COMPANY		

Table 6-8: Summary of Detected Analytes - Subsurface Soil Gas (15 feet bgs) Survey - RSE Investigation

Parameter ^b	Sample ID:	LK037	LK049	LK079	LK091	LK094	LK138	LK103	LK106	LK112
	Location ID:	AA3-HA07	AA3-HA11	AA3-HA21	AA3-HA25	AA3-HA26	AA3-HA26	AA3-HA29	AA3-HA30	AA3-HA32
	Sample Type:	Regular	Regular	Regular	Regular	Regular	Duplicate	Regular	Regular	Regular
	Sample Date:	10/10/2002	10/10/2002	10/14/2002	10/14/2002	10/14/2002	10/14/2002	10/15/2002	10/15/2002	10/15/2002
	Sample Depth:	15'	15'	15'	15'	15'	15'	15'	15'	15'
Fixed Gases (ASTM D-1946) ^a	Units									
Carbon Dioxide	%	17	25	13	4.8	1.7	2.9	10	5.5	16
Carbon Monoxide	%	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Methane	%	0.0068	1.8	13	1.7	0.56	1.2	1	1.3	0.00083
Nitrogen	%	82	70	63	82	77	85	86	89	78
Oxygen	%	2.3	3.6	1.7	1.5	12	1.4	1.6	3.2	3.9

NOTES:

U = indicates the analyte was not detected at or above the stated limit.

LEL = lower explosive limit

% = percent

VOCs = volatile organic compounds

AA3 = Anomaly Area 3

RSE = Removal Site Evaluation

^a Based on the field screening results of the gas monitor, 10% of soil gas samples (9 samples) were analyzed for fixed gases.

^b All subsurface soil gas samples were analyzed for VOCs in a mobile laboratory. However, all were below their respective reporting limits and are not presented in this summary table.

Methane concentration in **bold** indicates that it has exceeded the LEL threshold limit of 5 %.

Table 6-9: Summary of Field Screening Results – Perimeter Soil Gas Sampling – Round 1 RSE Investigation

Well ID	Sample ID	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Lower Explosive Limit (%)	Flame Ionization Detector Reading (ppm)
PZ1	LK266	0.0	2.5	17.4	0.0	0.0
PZ1	LK277	0.0	2.5	17.4	0.0	0.0
PZ2	LK265	0.0	2.7	17.5	0.0	0.0
PZ3	LK268	0.0	3.8	16.2	0.0	0.0
PG1S	LK269	0.0	1.0	19.2	0.0	0.0
PG1M	LK270	0.0	1.7	18.6	0.0	0.0
PG1D	LK271	0.0	1.6	18.1	0.0	0.0
PG2S	LK272	0.0	0.6	18.9	0.0	0.0
PG2M	LK273	0.0	1.1	18.3	0.0	0.0
PG2D	LK274	0.0	2.0	17.5	0.0	0.0
PG3S	LK275	0.0	0.3	19.3	0.0	5.0
PG3M	LK277	0.0	1.3	18.6	0.0	35.2
PG3D	LK276	0.0	1.3	18.6	0.0	35.2
PG3D	LK278	0.0	2.3	18.1	0.0	0.0

Table 6-10: Summary of Detected Analytes - Round 1 Perimeter Soil Gas Sampling - RSE Investigation

Parameter	Sample ID:	LK269	LK272	LK275	LK270	LK273	LK276	LK277	LK266	LK267	LK265	LK268	LK271	LK274	LK278
	Location ID:	AA3-PG01S	AA3-PG02S	AA3-PG03S	AA3-PG01M	AA3-PG02M	AA3-PG03M	AA3-PG03M	AA3-PZ01	AA3-PZ01	AA3-PZ02	AA3-PZ03	AA3-PG01D	AA3-PG02D	AA3-PG03D
	Sample Type:	Regular	Regular	Regular	Regular	Regular	Regular	Duplicate	Regular	Duplicate	Regular	Regular	Regular	Regular	Regular
	Sampling Date:	12/3/2002	12/3/2002	12/3/2002	12/3/2002	12/3/2002	12/3/2002	12/3/2002	12/3/2002	12/3/2002	12/3/2002	12/3/2002	12/3/2002	12/3/2002	12/3/2002
VOCs (EPA Method TO-14)	Units	Shallow Zone (5 - 7 feet bgs)			Intermediate Zone (14 – 16 feet bgs)				Deep Zone (greater than 16 feet bgs)						
1,2,4-Trimethylbenzene	µg/L	0.004	0.005 U	0.165 U	0.006	0.020 U	0.500 U	0.385 U	0.002 J	0.009	0.005	0.010	0.005	0.085 U	0.003
1,3,5-Trimethylbenzene	µg/L	0.002 U	0.005 U	0.165 U	0.005 U	0.020 U	0.500 U	0.385 U	0.002 U	0.003 U	0.200 U	0.003	0.200 U	0.085 U	0.200 U
2-Butanone (Methyl Ethyl Ketone)	µg/L	0.008	0.084	0.569	0.033	0.102	19.183	17.684	0.060	0.042	0.051	0.069	0.026	0.201 U	0.006 U
2-Propanol	µg/L	0.042	0.040	0.325 U	0.032	0.040	0.999 U	0.774 U	0.032	0.027	0.032	0.021	0.030	0.167 U	0.047
Acetone	µg/L	0.009	0.022	0.314 U	0.036	0.060	5.553	5.070	0.016	0.012	0.014	0.021	0.021	0.162 U	0.013
Benzene	µg/L	0.002 U	0.003 U	0.107 U	0.003 J	0.013 U	0.325 U	0.250 U	0.004	0.003	0.004	0.007	0.002 U	0.055 U	0.004
Carbon Disulfide	µg/L	0.006 U	0.013 U	0.411 U	0.013 U	0.051 U	1.266 U	0.981 U	0.009	0.009 U	0.007	0.006 U	0.007	0.212 U	0.020
Chloromethane	µg/L	0.001 U	0.002 U	0.069 U	0.006	0.008 U	0.210 U	0.162 U	0.001 U	0.010 U	0.001 U	0.003	0.002	0.036 U	0.001 U
Ethanol	µg/L	0.006	0.008 U	0.249 U	0.023	0.031 U	0.766 U	0.594 U	0.004	0.005 U	0.004 U	0.008	0.005	0.128 U	0.007
Ethyl Benzene	µg/L	0.002 U	0.004 U	0.146 U	0.004 U	0.018 U	0.441 U	0.340 U	0.002 U	0.003 U	0.002 U	0.004	0.002	0.075 U	0.002 U
Freon 12	µg/L	0.003	0.005 U	0.166 U	0.005 U	0.020 U	0.503 U	0.387 U	0.016	0.015	0.131	0.004	0.003	0.085 U	0.003
Heptane	µg/L	0.008 U	0.017 U	0.542 U	0.017 U	0.067 U	1.666 U	1.291 U	0.008 U	0.011 U	0.008 U	0.018	0.008 U	0.279 U	0.008 U
Hexane	µg/L	0.007 U	0.014 U	0.466 U	0.014 U	0.057 U	1.433 U	1.110 U	0.007 U	0.010 U	0.007 U	0.007 U	0.007 U	0.240 U	0.012
m,p-Xylene	µg/L	0.007	0.006	0.146 U	0.011	0.018 U	0.441 U	0.340 U	0.003	0.005	0.006	0.018	0.010	0.075 U	0.005
Methylene Chloride	µg/L	0.010	0.010	0.117 U	0.008	0.014 U	0.353 U	0.272 U	0.008	0.010	0.009	0.099	0.011	0.060 U	0.011
o-Xylene	µg/L	0.002 U	0.004 U	0.146 U	0.004 U	0.018 U	0.441 U	0.340 U	0.002 U	0.003 U	0.002	0.007	0.003	0.075 U	0.002 U
Tetrachloroethene	µg/L	0.003 U	0.007 U	0.228 U	0.007 U	0.028 U	0.689 U	0.531 U	0.003 U	0.005 U	0.006	0.003 U	0.003 U	0.117 U	0.003 U
Tetrahydrofuran	µg/L	0.093	0.989	26.976	0.569	3.896	74.933	65.941	0.216	0.141	0.210	0.243	0.300	12.888	0.007
Toluene	µg/L	0.008	0.007	0.126 U	0.011	0.015 U	0.383 U	0.295 U	0.007	0.007	0.008	0.172	0.012	0.065 U	0.010
Total VOCs (µg/L) ^a		0.190	1.15	27.55	0.74	4.10	99.67	88.70	0.38	0.27	0.49	0.71	0.44	12.89	0.14
Fixed Gases (ASTM D-1946) ^b															
Carbon Dioxide	%	1.8	1.3	1.1	2.3	1.9	2.2	2.2	0.31	3.9	4	4.6	0.44	2.8	3
Nitrogen	%	77	78	78	77	79	80	78	77	76	77	77	79	78	78
Oxygen	%	19	19	19	18	19	19	18	17	17	18	16	20	17	18

NOTES:

µg/L = micrograms per liter

% = percent

VOCs = volatile organic compounds

AA3 = Anomaly Area 3

RSE = Removal Site Evaluation

U = indicates the analyte was not detected at or above the stated limit.

J = indicates an estimated value.

^aThe hot spot threshold concentration for the RSE investigation soil gas samples was defined as 300 µg/L of total VOCs.

All perimeter soil gas samples were analyzed for methane, however, all were below reporting limits and are not presented in this summary table.

Map 1

Well MW02	Sample ID:	20242-984	20242-1124	LK264	LK340/LK341
	Sample Date:	11/02/95	04/19/96	12/4/2002	4/2/2003
MIBK	ug/L	50U	50U	50U	2.0 J
Bis (2-ethylhexyl) phthalate	ug/L	NA	NA	9.6 UJ	2 J
3/4-Methylphenol	ug/L	NA	NA	6J	9.6 U
Phenol	ug/L	NA	NA	12	9.6 U
Motor Oils	mg/L	NA	NA	0.37	0.08 J
PHC as diesel fuel	mg/L	0.096U	0.095U	1.3	0.02 J
Chromium	mg/L	50U	357	296	15.4
Manganese	mg/L	259	443	19.6	7.5
Total Uranium	pCi/L	NA	15.43	NA	NA
Gross Alpha	pCi/L	23.5	28.3	NA	NA

Well MW03	Sample ID:	20242-989	20242-1120	LK261	LK297
	Sample Date:	11/03/95	04/18/96	12/4/2002	3/19/2003
Chromium	mg/L	50.3	37.7	5.2	49.9
Total Uranium	pCi/L	NA	50.02	NA	NA
Gross Alpha	pCi/L	35.5	35.7	NA	NA

Well MW06	Sample ID:	LK240	LK299
	Sample Date:	11/26/2002	3/20/2003
MIBK	ug/L	50.0 U	0.5 J

Well MW04	Sample ID:	20242-981	20242-1122	LK258	LK329
	Sample Date:	11/01/95	04/19/96	12/3/2002	3/28/2003
Total Uranium	pCi/L	NA	56.01	NA	NA
Gross Alpha	pCi/L	50	45.9	NA	NA
Butylbenzylphthalate	ug/L	NA	NA	9.6 U	0.7 J

Well MW10	Sample ID:	LK252	LK301
	Sample Date:	12/2/2002	3/20/2002
MIBK	ug/L	50.0 U	0.3 J

Well MW08	Sample ID:	LK377	LK237/LK338
	Sample Date:	12/3/2002	4/2/2003
PHC as diesel fuel	mg/L	0.008J	0.096 U
Diethylphthalate	ug/L	2J	9.6 U
Chloroform	ug/L	0.61	0.1 U

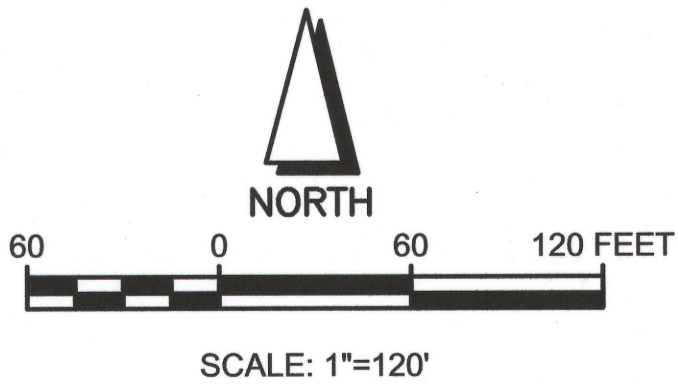
Well MW01	Sample ID:	20242-987	20242-1123	LK256	LK332/LK333
	Sample Date:	11/02/95	04/19/96	12/3/2002	4/1/2003
MTBE	ug/L	2.6J	10U	3U	3 U
Diethylphthalate	ug/L	NA	NA	2J	9.6 U
Nickel	mg/L	150U	150U	105	55.3 J
Total Uranium	pCi/L	NA	38.4	NA	NA
Gross Alpha	pCi/L	34.6	27.6	NA	NA
Manganese	mg/L	80.2	20 U	19.6	7.5

LEGEND

- MINOR SURFACE ELEVATION: 2-FOOT INTERVALS
- MAJOR SURFACE ELEVATION: 10-FOOT INTERVALS
- MCAS EL TORO BOUNDARY
- EXISTING STREAM OR WASH
- PREVIOUSLY ESTIMATED EXTENT OF WASTE PLACEMENT BEFORE RSE INVESTIGATION (EARTH TECH 2001)
- REVISED EXTENT OF WASTE PLACEMENT BASED ON TRENCHING ACTIVITY (MARCH 2000 AND OCTOBER 2002)
- MW06 RSE GROUNDWATER MONITORING WELL LOCATION
- MW4 EXISTING GROUNDWATER MONITORING WELL LOCATION
- NA NOT ANALYZED
- U ANALYTE WAS NOT DETECTED AT OR ABOVE THE STATED LIMIT
- UJ ANALYTE WAS NOT DETECTED AT OR ABOVE THE STATED LIMIT. THE SAMPLE DETECTION LIMIT IS AN ESTIMATED VALUE
- MIBK 4-METHYL-2-PENTANONE
- GROUNDWATER GRADIENT DIRECTION - DECEMBER 2002

NOTES

- TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHOD FROM AERIAL PHOTOGRAPHY DATED DECEMBER 2001 BY SAN-LO AERIAL SURVEYS.
- COORDINATES ARE IN CALIFORNIA STATE PLANE COORDINATE SYSTEM, NAD 83, ZONE 6.
- ELEVATIONS IN FEET; BENCHMARK BASED ON NORTH AMERICAN VERTICAL DATUM 1988.
- RED INDICATES THAT THE PARTICULAR ANALYTE CONCENTRATIONS HAVE EXCEEDED THEIR RESPECTIVE MCL CONCENTRATION.



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Detected Groundwater Sampling Results -
All Sampling Events

Removal Site Evaluation for Anomaly Area 3

Date: 11-03	MCAS El Toro	Figure 6-11
Project No. 37380	EARTH  TECH A tyco INTERNATIONAL LTD. COMPANY	

Table 6-11: Statistics of Detected Analytes – Round 1 Perimeter Soil Gas Sampling – RSE Investigation

Analyte	Number of Samples Analyzed ^a	Number of Detections	Minimum and Maximum Concentrations (µg/L)	Frequency of Detection (%)
Shallow Zone				
1,2,4-Trimethylbenzene	3	1	0.004	33
2-Butanone	3	3	0.01–0.57	100
2-Propanol	3	2	both 0.04	66
Acetone	3	2	0.01–0.02	66
Ethanol	3	1	0.01	33
Freon 12	3	1	0.0032	33
m,p-Xylene	3	2	both 0.01	33
Methylene Chloride	3	2	both 0.01	33
Tetrahydrofuran	3	3	0.09–26.98	100
Toluene	3	2	both 0.01	66
Methane	3	0	—	0
Intermediate Zone				
1,2,4-Trimethylbenzene	4	1	0.01	25
2-Butanone	4	4	0.03–19.18	100
2-Propanol	4	2	0.03 and 0.04	50
Acetone	4	4	0.04–5.55	100
Benzene	4	1	0.0032J	25
m,p-Xylene	4	1	0.01	25
Methylene Chloride	4	1	0.01	25
Tetrahydrofuran	4	4	0.57–74.93	100
Toluene	4	1	0.01	25
Methane	4	0	—	0
Deep Zone				
1,2,4-Trimethylbenzene	7	6	0.002J–0.01	86
1,3,5-Trimethylbenzene	7	1	0.003	14
2-Butanone	7	5	0.026–0.069	71
2-Propanol	7	6	0.021–0.047	86
Acetone	7	6	0.012–0.021	86
Benzene	7	5	0.003–0.004	71
Carbon Disulfide	7	4	0.007–0.02	57
Chloromethane	7	2	0.002 and 0.003	29
Ethanol	7	4	0.004–0.008	57
Ethyl Benzene	7	2	0.002 and 0.004	29
Freon 12	7	6	0.003–0.131	86
Heptane	7	1	0.018	14
Hexane	7	1	0.012	14
m,p-Xylene	7	6	0.003–0.018	86
Methylene Chloride	7	6	0.008–0.011	86
o-Xylene	7	3	0.002–0.007	43
Tetrahydrofuran	7	7	0.007–12.888	100
Toluene	7	6	0.007–0.172	86
Methane	7	0	—	0

Notes: ^a Number of samples analyzed for the specified analyte, including duplicates, if any.

Table 6-12: Summary of Field Screening Results – Round 2 Perimeter Soil Gas Sampling – RSE Investigation

Well ID	Sample ID	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Lower Explosive Limit (%)	Flame Ionization Detector Reading (ppm)
PZ1	LK314	0.0	3.6	17.0	0.0	0.0
PZ2	LK315	0.0	3.6	17.6	0.0	0.0
PZ3	LK316	0.0	4.2	16.6	0.0	0.0
PG1S	LK304	0.0	1.4	17.5	0.0	1.1
PG1M	LK305	0.0	6.8	10.2	0.0	1.2
PG1D	LK303	0.0	4.6	12.8	0.0	0.0
PG2S	LK306	0.0	2.5	17.6	0.0	0.4
PG2M	LK307	0.0	2.6	17.3	0.0	3.0
PG2D	LK308	0.0	3.1	17.0	0.0	1.8
PG3S	LK309	0.0	2.4	18.1	0.0	4.4
PG3S	LK310	0.0	2.4	18.1	0.0	4.4
PG3M	LK311	0.0	2.5	17.7	0.0	6.6
PG3M	LK312	0.0	2.5	17.7	0.0	6.6
PG3D	LK313	0.0	3.0	17.6	0.0	3.8
PG3D	LK317	—	—	—	—	—

Table 6-13: Summary of Detected Analytes - Round 2 Perimeter Soil Gas Sampling - RSE Investigation

PARAMETER	Sample ID:		LK304	LK306	LK309	LK310	LK305	LK307	LK311	LK312	AA3-PZ01	AA3-PZ02	AA3-PZ03	AA3-PG01D	AA3-PG02D	AA3-PG03D	
	Location ID:		AA3-PG01S	AA3-PG02S	AA3-PG03S	AA3-PG03S	AA3-PG01M	AA3-PG02M	AA3-PG03M	AA3-PG03M	Regular	Regular	Regular	Regular	Regular	Duplicate	
	Sample Type:		Regular	Regular	Regular	Duplicate	Regular	Regular	Regular	Duplicate	3/21/2003	3/21/2003	3/21/2003	3/20/2003	3/20/2003	3/20/2003	
	Sampling Date:		3/20/2003	3/20/2003	3/20/2003	3/20/2003	3/20/2003	3/20/2003	3/20/2003	3/20/2003	3/21/2003	3/21/2003	3/21/2003	3/20/2003	3/20/2003	3/20/2003	
VOCs		Units	Method	Shallow Zone (5 - 7 feet bgs)						Intermediate Zone (14 -- 16 feet bgs)		Deep Zone (greater than 16 feet bgs)					
1,2,4-Trimethylbenzene	µg/L	TO-14A	0.002 U	0.003	0.004	0.002 U	0.004	0.003	0.025 U	0.020 U	0.003	0.002 U	0.005	0.003	0.002 U	0.005	
2-Butanone (Methyl Ethyl Ketone)	µg/L	TO-14A	0.006 U	0.006 U	0.016	0.006 U	0.006 U	0.006 U	1.529	1.798	0.006 U	0.006 U	0.006 U	0.054	0.006 U	0.006 U	
2-Propanol	µg/L	TO-14A	0.087	0.072	0.080	0.075	0.057	0.090	0.095	0.097	0.097	0.117	0.062	0.055	0.097	0.027	
Acetone	µg/L	TO-14A	0.020	0.017	0.019	0.012	0.016	0.015	0.290	0.290	0.017	0.017	0.019	0.021	0.015	0.015	
Benzene	µg/L	TO-14A	0.002 U	0.002 U	0.003	0.002 U	0.002 U	0.002 U	0.016 U	0.013 U	0.002	0.002	0.009	0.002 U	0.002 U	0.012	
Chloromethane	µg/L	TO-14A	0.002	0.001 U	0.003	0.003	0.001 U	0.002	0.010 U	0.008 U	0.001 U	0.001 U	0.001 U	0.002	0.002	0.001 U	
Ethanol	µg/L	TO-14A	0.004	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.038 U	0.031 U	0.005	0.004	0.009	0.004 U	0.004 U	0.015	
Ethyl Benzene	µg/L	TO-14A	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.022 U	0.018 U	0.002 U	0.002 U	0.003	0.002 U	0.002 U	0.003	
Freon 11	µg/L	TO-14A	0.003 U	0.003 U	0.003 U	0.003 U	0.003	0.003 U	0.029 U	0.023 U	0.003 U	0.003 U	0.003 U	0.004	0.003 U	0.003 U	
Freon 113	µg/L	TO-14A	0.009	0.004 U	0.004 U	0.004 U	0.027	0.004 U	0.039 U	0.031 U	0.004 U	0.004 U	0.004 U	0.028	0.004 U	0.004 U	
Freon 12	µg/L	TO-14A	0.003	0.004	0.003	0.003	0.005	0.004	0.025 U	0.020 U	0.014	0.111	0.003	0.006	0.004	0.003	
m,p-Xylene	µg/L	TO-14A	0.003	0.003	0.005	0.003	0.004	0.004	0.022 U	0.018 U	0.006	0.005	0.013	0.003	0.003	0.011	
Methylene Chloride	µg/L	TO-14A	0.014	0.011	0.011	0.007	0.011	0.011	0.019	0.014 U	0.011	0.012	0.011	0.007	0.011	0.002	
o-Xylene	µg/L	TO-14A	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.022 U	0.018 U	0.002 U	0.002 U	0.004	0.002 U	0.002 U	0.003	
Tetrachloroethene	µg/L	TO-14A	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.034 U	0.028 U	0.003 U	0.006	0.003 U	0.003 U	0.004	0.003 U	
Tetrahydrofuran	µg/L	TO-14A	0.012	0.017	0.063	0.011	0.022	0.084	3.896	4.796	0.006 U	0.006 U	0.007	0.123	0.057	0.006 U	
Toluene	µg/L	TO-14A	0.005	0.005	0.006	0.005	0.005	0.005	0.019 U	0.015 U	0.009	0.009	0.025	0.004	0.004	0.019	
Trichloroethene	µg/L	TO-14A	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.027 U	0.022 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.006	
Vinyl Chloride	µg/L	TO-14A	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.013 U	0.010 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001	
Total VOCs (µg/L) ³			0.16	0.13	0.21	0.12	0.15	0.22	5.83	6.98	0.16	0.28	0.17	0.31	0.20	0.12	
Fixed Gases																	
Carbon Dioxide	%	ASTM D-1946	2	2	1.9	1.9	10	2.1	2.1	2	3	3.1	3.2	12	2.6	2.4	
Methane	%	ASTM D-1946	0.00019	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	
	ppmv		1.9	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Nitrogen	%	ASTM D-1946	77	75	76	74	77	76	75	75	74	74	75	77	75	75	
Oxygen	%	ASTM D-1946	18	18	19	19	8	18	18	18	18	18	18	6.2	18	19	

NOTES:
µg/L = micrograms per liter
% = percent
VOCs = volatile organic compounds
AA3 = Anomaly Area 3
RSE = Removal Site Evaluation
U = indicates the analyte was not detected at or above the stated limit.
J = indicates an estimated value.

^aThe hot spot threshold concentration for the RSE investigation soil gas samples was defined as 300 µg/L of total VOCs.

The LEL threshold value for methane is 5 % or 50,000 ppmv

Table 6-14: Summary of Field Screening Results – Round 3 Perimeter Soil Gas Sampling – RSE Investigation

Well ID	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Lower Explosive Limit (%)	Flame Ionization Detector Reading (ppm)
PZ1	0.0	1.6	17.5	0.0	5.0
PZ2	0.0	1.9	17.8	0.0	4.3
PZ3	0.0	2.4	16.7	0.0	4.4
PG1S	0.0	0.0	19.7	0.0	7.6
PG1M	0.0	0.0	19.7	0.0	12.9
PG1D	0.0	0.0	19.7	0.0	0.0
PG2S	0.0	0.0	19.6	0.0	8.6
PG2M	0.0	0.9	18.6	0.0	6.7
PG2D	0.0	1.8	17.9	0.0	7.9
PG3S	0.0	0.5	19.9	0.0	6.6
PG3M	0.0	1.0	19.2	0.0	9.6
PG3D	0.0	1.6	18.6	0.0	5.3

During previous investigation, surface soil samples (0 to 1 feet bgs) were not collected. In order to have an adequate data set to evaluate the risk posed due to surface contamination at the site and to support RSE decision rule #3, surface soil samples were collected from the same boreholes that were drilled at the centers of 100- by 100-foot grids as part of the soil gas survey.

This section presents the nature and extent of surface soil samples collected during this RSE investigation, as well as the subsurface soil samples collected during previous investigation.

6.4.1 Surface Soil Sampling Results - RSE Investigation

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Thirty-seven surface soil samples, including four duplicate samples were collected from 0 to 1 foot depths. The sample collection details are presented in Table G-1 of Appendix G. The complete data sets for the surface soil samples are provided in Table G-2 of Appendix G. Summarized detected results (except dioxins) are presented in Table 6-15. Target compounds for dioxin and dioxin-like compounds are the analytes in the WHO list of compounds with toxicity equivalency factors (TEFs). The product of the analyte concentration and its associated TEF was compared with the residential and industrial soil PRG for the dioxin 2,3,7,8-tetrachlorodibenzodioxin (TCDD) for the evaluation of dioxin contamination in residential and industrial settings. Dioxin results and details of quantification of total 2,3,7,8-TCDD concentrations for ten surface soil samples are presented in Table 6-16. Figure 6-9 shows the spatial distribution of the detected analytes in the surface soil at AA 3. All the detected organic compounds are shown on the Figure 6-9. Statistics performed on the detected analytes, including a comparison to residential PRGs, is presented in Table 6-17.

None of the 37 samples (including duplicates) analyzed for VOCs had detectable concentrations. Petroleum hydrocarbons were detected at very low concentrations in most locations. Detected SVOCs include bis(2-ethylhexyl)phthalate, diethylphthalate, anthracene, benzo(a)-anthracene, B[a]P, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)-anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, phenanthrene, and pyrene (Table 6-15, Table 6-16, and Figure 6-9). Most of the SVOC detections were from locations HA01, HA03, HA15, and HA29. Maximum concentrations of SVOC detections are from location HA15, and four of the SVOC detections (benzo(a)anthracene [730J micrograms per kilogram ($\mu\text{g/kg}$)], benzo(b)-fluoranthene [1,790J $\mu\text{g/kg}$], benzo(k)-fluoranthene [510J $\mu\text{g/kg}$], and dibenz(a,h)-

anthracene [97J µg/kg]) exceed their respective residential PRGs at this location. The B[a]P concentration (1,030J µg/kg) at HA15 exceeds both its residential and industrial PRGs. In summary, only 5 SVOCs at only one location (HA15) out of 33 surface soil sampling locations exceed residential PRGs.

All ten samples that were analyzed for dioxin and furan constituents had detected concentrations. Only two surface samples (regular sample [20.21 pg/g] and its duplicate [16.67 pg/g]) collected from location HA26 had total 2,3,7,8-TCDD concentrations exceeding the residential and industrial PRG of 3.9 pg/g and 20 pg/g, respectively. Location HA26 is approximately 50 feet south of the subsurface location (6 feet bgs) of the dioxin detection recorded in the previous investigation. All other samples had total 2,3,7,8-TCDD concentrations of less than 1 pg/g. In summary, 2,3,7,8-TCDD exceeded its residential PRG at only one out of nine surface soil sampling locations analyzed for dioxin and furan.

in the field

The decision input section (Section 4.2.3 of the RSE work plan) of the DQO process, specifies that of the total metals detected, only those metals that exceeded the former MCAS El Toro background concentrations would be compared with the PRGs. However, even though arsenic was detected in the surface soil at concentrations below the former MCAS El Toro background value (6.86 mg/kg) (BNI 1996), it is presented in the Table 6-15 since all samples exceed its residential and industrial PRG values (0.39 mg/kg and 1.6 mg/kg, respectively). Figure 6-9 presents only those detected metals that exceed the former MCAS El Toro background concentrations. No other metals exceeded the PRG concentrations; however, metals that exceeded the former MCAS El Toro background concentrations include aluminum (1 sample – 15,800 mg/kg), barium (1 sample – 187 mg/kg), cobalt (3 samples ranging from 7.3 to 7.6 mg/kg), copper (2 samples with 2.8 and 10.8 mg/kg), iron (2 samples with 18,400 and 19,100 mg/kg), lead (4 samples ranging from 15.5 to 20.7 mg/kg), selenium (21 samples ranging from 0.27 to 1.1 mg/kg), and silver (1 sample – 2 mg/kg). In summary, all metals that were analyzed were less than either background or PRG concentrations at all 33 surface soil sampling locations.

6.4.2 Subsurface Soil Sampling – Previous Investigation

As part of March 2000 exploratory trenching activity at the AA 3 site, 24 subsurface soil samples (including duplicates) were collected. These samples were analyzed for petroleum hydrocarbons, VOCs, SVOCs including polynuclear aromatic hydrocarbons (PAH) compounds, metals, asbestos, and perchlorate. Section 3.5 and Tables 3-4 and 3-5 present details of the subsurface soil sampling. Two out of 24 samples were also analyzed for dioxins and furans. For convenience, the summarized table of detected analytes is presented again in this section as Table 6-18. Table 6-19 presents the frequency of detection of analytes and a comparison with PRGs. The table also presents a comparison of metals to the former MCAS El Toro background concentrations and the PRGs. Figure 6-10 presents the spatial distribution of detected analytes.

None of the samples analyzed for asbestos and perchlorate had detectable concentrations. Diesel range TPHs were detected in 19 of 24 soil samples, with a maximum concentration of 5,600 mg/kg in sample 20242-1102. Detected VOCs include 2-butanone (detected in 17 percent of the samples), acetone (21 percent of samples), benzene (4 percent of samples), methylene chloride (33 percent of samples, and styrene (4 percent of samples); none of the detected VOCs exceeds residential or industrial PRGs. Sample 20242-111 collected from trench H5 at a depth of 7 feet bgs reported maximum concentrations of all of the SVOC analytes (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, chrysene, diethylphthalate, fluoranthene, indeno[1,2,3-cd]pyrene, phenanthrene and pyrene).

Table 6-15: Summary of Detected Analytes (Except Dioxins) - Surface Soil (0 - 1feet bgs) - RSE Investigation

Parameter	PRGs		Background (0.95 Quantile)	Sample ID:	LK017	LK020	LK023	LK026	LK029	LK032	LK035	LK038	LK041	LK044	LK047	LK050	LK117	LK053
				Location ID:	HA01	HA02	HA03	HA04	HA05	HA06	HA07	HA08	HA09	HA10	HA11	HA12	HA12	HA13
				Sample Type:	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Duplicate	Regular
				Sample Date:	10/9/2002	10/9/2002	10/9/2002	10/9/2002	10/9/2002	10/9/2002	10/9/2002	10/10/2002	10/10/2002	10/10/2002	10/10/2002	10/11/2002	10/11/2002	10/10/2002
	Residential	Industrial		Sample Depth:	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'
TPH (8015B DRO) ^b	-	-	-	Units														
MOTOR OILS	-	-	-	mg/kg	10J	12U	86	160	11U	10U	3J	43	8J	13U	11U	14	7J	11U
PHC AS DIESEL FUEL	-	-	-	mg/kg	12U	12U	15	100U	11U	10U	10U	2J	0.8J	13U	11U	3J	11U	11U
PHC AS GASOLINE	-	-	-	mg/kg	0.04J	0.03J	0.03J	0.1J	0.03J	0.02J	0.03J	10U	0.04J	0.04J	0.03J	0.03J	0.03J	0.03J
SVOCs (EPA Method 8270C) ^b																		
BIS(2-ETHYLHEXYL)PHTHALATE	34,700	123,000	-	ug/kg	610U	580U	1200U	1000U	560U	520U	520U	65J	520U	630U	540U	530U	540U	550U
DIETHYLPHthalATE	48,882,000	100,000,000	-	ug/kg	610U	580U	1200U	1000U	560U	520U	520U	1000U	520U	630U	540U	530U	540U	550U
PHENOL	37,000,000	100,000,000	-	ug/kg	610U	110J	410J	1000U	560U	520U	520U	1000U	210J	150J	220J	530U	540U	550U
PAHs (PAH-SIM) ^b																		
ANTHRACENE	21,896,121	100,000,000	-	ug/kg	30UJ	29UJ	29UJ	25UJ	28UJ	26UJ	26UJ	25UJ	26UJ	32UJ	27UJ	26UJ	27UJ	27UJ
BENZO(A)ANTHRACENE	621	2,110	-	ug/kg	16J	29UJ	19J	18J	28UJ	26UJ	7J	25UJ	26UJ	32UJ	27UJ	26UJ	27UJ	27UJ
BENZO(A)PYRENE	62	211	-	ug/kg	30U	29U	11J	10J	28U	26U	26U	25U	26U	32U	27U	26U	27U	27U
BENZO(B)FLUORANTHENE	621	2,110	-	ug/kg	8J	29UJ	17J	15J	28UJ	26UJ	26UJ	25UJ	26UJ	32UJ	27UJ	26UJ	27UJ	27UJ
BENZO(G,H,I)PERYLENE	-	-	-	ug/kg	30U	29U	11J	7J	28U	26U	26U	25U	26U	32U	27U	26U	27U	27U
BENZO(K)FLUORANTHENE	378	1,283	-	ug/kg	30UJ	29UJ	13J	7J	28UJ	26UJ	26UJ	25UJ	26UJ	32UJ	27UJ	26UJ	27UJ	27UJ
CHRYSENE	3,781	12,834	-	ug/kg	10J	29U	29U	8J	28U	26U	26U	25U	26U	32U	27U	26U	27U	27U
DIBENZ(A,H)ANTHRACENE	62	211	-	ug/kg	30U	29U	29UJ	25U	28U	26U	26U	25U	26U	32U	27U	26U	27U	27U
FLUORANTHENE	2,293,610	22,000,353	-	ug/kg	16J	29U	8J	11J	28U	26U	26U	25U	26U	32U	27U	26U	27U	27U
INDENO(1,2,3-C,D)PYRENE	621	2,110	-	ug/kg	30UJ	29UJ	29UJ	25UJ	28UJ	26UJ	26UJ	25UJ	26UJ	32UJ	27UJ	26UJ	27UJ	27UJ
PHENANTHRENE	-	-	-	ug/kg	9J	29U	29U	25U	28U	26U	26U	25U	26U	32U	27U	26U	27U	27U
PYRENE	2,315,951	29,126,201	-	ug/kg	16J	29UJ	11J	14J	28UJ	26UJ	26UJ	25U	26U	32U	27U	26U	27U	27U
Metals (EPA Method 6010B) ^a																		
ALUMINUM	76,000	100,000	14,800	mg/kg	6550	4330	8190	8960	9680	6650	5320	7120	3570	7700	12400	14300	12100	11100
ANTIMONY	31	410	3.06	mg/kg	2.1	7U	7.1U	6U	6.8U	6.2U	6.3U	6.1U	6.2U	0.29UJ	6.5U	6.3U	6.5U	6.5U
ARSENIC	0.39	1.6	6.86	mg/kg	2.6	1.7	3.1	3.3	3.1	2.2	1.9	2.7	1.6	4.1	3.5	3.7	3.8	3.3
BARIUM	5,400	67,000	173	mg/kg	98.5	50.9	67.8	110	98.8	77.8	59.6	111	105	95.4	119	118	115	120
BERYLLIUM	154	1,941	0.669	mg/kg	0.48U	0.46U	0.099UJ	0.029UJ	0.091UJ	0.1UJ	0.059UJ	0.41U	0.41U	0.056UJ	0.15UJ	0.33	0.13UJ	0.44U
CADMIUM	1.7	7.4	2.35	mg/kg	0.28	0.44	0.35	0.49	0.67	0.48	0.46	0.56	0.093J	0.39	0.98	0.88	0.78	0.6
CALCIUM	-	-	46,000	mg/kg	5120	1590	4960	7110	4110	2390	2000	4090	2980J	4480J	3940J	4090J	4290J	5920J
CHROMIUM	211	448	26.9	mg/kg	7.8	5.2	10.9	11.9	12.4	6.2	6.3	8.8	8.9	9	12.2	12.1	11.3	11.5
COBALT	903	1,921	6.98	mg/kg	4.4	2.5	4.6	5.4	5.2	3.4	3	4.4	2.8	5.3	5.8	5.8	6	5.6
COPPER	3,129	40,877	10.5	mg/kg	3.9	2.9	7	8.2	8.2	3.5	3.3	4.6	2.4	8	7.2	7.4	8.7	6
IRON	23,463	100,000	18,400	mg/kg	9540	5880	10200	12400	12500	8440	6990	10400	6820J	12000J	13700J	15100J	13800J	13200J
LEAD	150	750	15.1	mg/kg	4.7	1.6	15.5	20.7	9.5	2.6	4.2	7.2	2.5	20.6	4.7	5	10	4.7
MAGNESIUM	-	-	8,370	mg/kg	3320	1780	3110	4490	4960	2790	2260	3620	2030J	3860J	5000J	5540J	5150J	4840J
MANGANESE	1,762	19,458	291	mg/kg	177J	104J	151J	201J	193J	145J	128J	173J	119	180	242	234	228	217
MERCURY (EPA Method 7471A)	23.5	307	0.22	mg/kg	0.038	0.034	0.069	0.051	0.039	0.028	0.041	0.028	0.02	0.037	0.027	0.027	0.023	0.028
NICKEL	1,564	20,439	15.3	mg/kg	4.7	4.4	7.4	7.8	8.2	5.2	4.9	6.2	5.1	6.4	10.1	9.5	8.5	7.9
POTASSIUM	-	-	4,890	mg/kg	2290J	1210J	1800J	2760J	3310J	1850J	1560J	2490J	1100J	2500J	3010J	3280J	3070J	2920J
SELENIUM	391	5,110	0.32	mg/kg	0.48	0.47	0.57	0.73	0.5	0.49	0.41	0.76	0.27	0.68	0.53	0.87	0.82	0.72
SILVER	391	5,110	0.539	mg/kg	1.2U	1.2U	1.2U	1U	1.1U	1U	1U	1U	1U	1.3UJ	1.1UJ	1.1UJ	1.1UJ	1.1UJ
VANADIUM	547	7,154	71.8	mg/kg	21.6	13.5	22.7	28.2	26.8	18	15.4	24.3	16.4	26.1	31.5	33.5	32.4	31.7
ZINC	23,463	100,000	77.9	mg/kg	28	16.4	37.1	50.3	41.6	23.3	21.6	45	15.8	37.2	38.1	41.2	43.5	40.1

Table 6-15: Summary of Detected Analytes (Except Dioxins) - Surface Soil (0 - 1feet bgs) - RSE Investigation

Parameter	PRGs		Background (0.95 Quantile)	Sample ID:	LK116	LK056	LK059	LK062	LK065	LK068	LK071	LK074	LK077	LK080	LK083	LK086	LK089	LK092
				Location ID:	HA13	HA14	HA15	HA16	HA17	HA18	HA19	HA20	HA21	HA22	HA23	HA24	HA25	HA26
				Sample Type:	Duplicate	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular
				Sample Date:	10/10/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/11/2002	10/14/2002	10/14/2002	10/14/2002	10/14/2002	10/14/2002	10/14/2002	10/14/2002
	Residential	Industrial		Sample Depth:	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'
TPH (8015B DRO) ^b	-	-	-	Units														
MOTOR OILS	-	-	-	mg/kg	8J	5J	49	12U	11U	18	14	11U	40	11U	12U	10U	12U	20
PHC AS DIESEL FUEL	-	-	-	mg/kg	0.9J	11U	3J	12U	11U	1J	11U	1J	4J	11U	12U	10U	12U	2J
PHC AS GASOLINE	-	-	-	mg/kg	0.03J	0.03J	0.04J	0.03J	0.03J	0.03J	0.03J	0.02J	0.02J	0.03J	12U	11U	12U	0.05J
SVOCs (EPA Method 8270C) ^b																		
BIS(2-ETHYLHEXYL)PHTHALATE	34,700	123,000	-	ug/kg	600U	570U	1000U	590U	560U	530U	560U	540U	540U	560U	620U	520U	580U	590U
DIETHYLPHTHALATE	48,882,000	100,000,000	-	ug/kg	600U	570U	1000U	590U	560U	530U	560U	540U	540U	560U	620U	520U	580U	590U
PHENOL	37,000,000	100,000,000	-	ug/kg	110J	570U	1000U	590U	560U	530U	695	540U	540U	936	450J	520U	250J	590U
PAHs (PAH-SIM) ^b																		
ANTHRACENE	21,896,121	100,000,000	-	ug/kg	30UJ	29UJ	44J	29UJ	28UJ	26UJ	28UJ	27UJ	27UJ	28UJ	31UJ	26UJ	29UJ	30UJ
BENZO(A)ANTHRACENE	621	2,110	-	ug/kg	30UJ	29UJ	730J	29UJ	28UJ	26UJ	28UJ	27UJ	27UJ	28UJ	31UJ	26UJ	29UJ	13J
BENZO(A)PYRENE	62	211	-	ug/kg	30U	29U	1030J	29U	28U	26U	28U	27U	27U	28U	31U	26U	29U	30U
BENZO(B)FLUORANTHENE	621	2,110	-	ug/kg	30UJ	29UJ	1790J	29UJ	28UJ	26UJ	28UJ	27UJ	27UJ	28UJ	31UJ	26UJ	29UJ	30UJ
BENZO(G,H,I)PERYLENE	-	-	-	ug/kg	30U	29U	440J	29U	28U	26U	28U	27U	27U	28U	31U	26U	29U	30U
BENZO(K)FLUORANTHENE	378	1,283	-	ug/kg	30UJ	29UJ	510J	29UJ	28UJ	26UJ	28UJ	27UJ	27UJ	28UJ	31UJ	26UJ	29UJ	30UJ
CHRYSENE	3,781	12,834	-	ug/kg	30U	29U	870	29U	28U	26U	28U	27U	27U	28U	31U	26U	29U	30U
DIBENZ(A,H)ANTHRACENE	62	211	-	ug/kg	30U	29U	97J	29U	28U	26U	28U	27U	27U	28U	31U	26U	29U	30U
FLUORANTHENE	2,293,610	22,000,353	-	ug/kg	30U	29U	1000	29U	28U	26U	28U	27U	27U	28U	31U	26U	29U	30U
INDENO(1,2,3-C,D)PYRENE	621	2,110	-	ug/kg	30UJ	29UJ	460J	29UJ	28UJ	26UJ	28UJ	27UJ	27UJ	28UJ	31UJ	26UJ	29UJ	30UJ
PHENANTHRENE	-	-	-	ug/kg	30U	29U	290	29U	28U	26U	28U	27U	27U	28U	31U	26U	29U	30U
PYRENE	2,315,951	29,126,201	-	ug/kg	30U	29U	960	29U	28U	26U	28U	27U	27UJ	28U	31U	26U	29U	30U
Metals (EPA Method 6010B) ^a																		
ALUMINUM	76,000	100,000	14,800	mg/kg	12100	8030	9350	7860	7980	9340	9690	10900	5590	15000	13200	9320	6920	14300
ANTIMONY	31	410	3.06	mg/kg	7.2U	6.8U	6.2U	7.1U	0.32UJ	6.3U	0.28UJ	6.5U	6.5U	6.8U	7.4U	6.3U	7U	7.1U
ARSENIC	0.39	1.6	6.86	mg/kg	4.7	2.9	2.9	2.2	3	2.9	2.8	2.7	2.2	4.6	3.6	3	2.5	4.7
BARIUM	5,400	67,000	173	mg/kg	142	73.6	89	87.9	94.5	101	93.3	105	60.3	187	122	104	79.3	163
BERYLLIUM	154	1,941	0.669	mg/kg	0.13UJ	0.053UJ	0.1UJ	0.47U	0.14UJ	0.16UJ	0.098UJ	0.14	0.052UJ	0.29	0.31	0.22	0.12	0.27
CADMIUM	1.7	7.4	2.35	mg/kg	1.1	0.46	0.59	0.62	0.69	0.78	0.83	0.65	0.55	1	0.92	0.86	0.62	0.98
CALCIUM	-	-	46,000	mg/kg	5060J	5250J	25200J	2510J	3800J	3300J	3260J	5340	2720	6050	4720	3600	3540	5540
CHROMIUM	211	448	26.9	mg/kg	13.6	8.3	8.7	14.6	8.8	8.9	9.7	12.3	5.8	15.8	13	10.6	7.1	18.2
COBALT	903	1,921	6.98	mg/kg	6.7	3.8	4	4.2	4.7	4.5	5	4.7	3	7.6	5.5	4.8	3.8	7.3
COPPER	3,129	40,877	10.5	mg/kg	12.8	3.6	4.3	5.1	5.2	5.6	6.8	7	3.3	10.8	7.6	6.8	4.4	12.8
IRON	23,463	100,000	18,400	mg/kg	15700J	9310J	10100J	9650J	11000J	11100J	11800J	13000	8070	19400	15300	12600	9990	19100
LEAD	150	750	15.1	mg/kg	17	2.5	2.9	7.5	6.3	4.3	8.3	4.7	2	12.4	5.8	9.2	2.9	15
MAGNESIUM	-	-	8,370	mg/kg	5620J	3350J	3820J	3060J	3910J	3750J	4090J	4230	2530	6770	5190	4140	3340	6790
MANGANESE	1,762	19,458	291	mg/kg	252	161	167	178	207	197	216	221J	126J	289J	227J	197J	164J	277J
MERCURY (EPA Method 7471A)	23.5	307	0.22	mg/kg	0.029	0.021	0.022	0.029	0.027	0.019	0.041	0.018	0.012	0.021	0.026	0.02	0.021	0.02
NICKEL	1,564	20,439	15.3	mg/kg	10.6	6	6.4	9	7.4	7	7.7	7.8	4.7	12.1	9	8.3	5.7	11.8
POTASSIUM	-	-	4,890	mg/kg	3540J	1880J	2150J	2190J	2470J	2450J	2530J	2670J	1440J	3970J	3300J	2670J	1980J	4170J
SELENIUM	391	5,110	0.32	mg/kg	0.63	0.45	0.42	0.54	0.65	0.72	1.1	0.65U	0.29	0.68U	0.74U	0.63U	0.7U	0.71U
SILVER	391	5,110	0.539	mg/kg	1.2UJ	1.1UJ	1UJ	1.2UJ	1.1UJ	1.1UJ	1.1UJ	1.1U	1.1U	1.1U	1.2U	1U	1.2U	1.2U
VANADIUM	547	7,154	71.8	mg/kg	35.4	22.1	25.1	22.2	23.1	24.2	27.3	29.2	17.4	44.1	33.3	27.5	21.6	41.7
ZINC	23,463	100,000	77.9	mg/kg	57.8	23.7	26.8	30.8	30.8	30.9	34.1	33.5	20.9	57.1	49.6	36.6	26.7	60.8

Table 6-15: Summary of Detected Analytes (Except Dioxins) - Surface Soil (0 - 1feet bgs) - RSE Investigation

Parameter	PRGs		Background (0.95 Quantile)	Sample ID:	LK118	LK095	LK098	LK101	LK104	LK107	LK110	LK113	LK119
				Location ID:	HA26	HA27	HA28	HA29	HA30	HA31	HA32	HA33	HA33
				Sample Type:	Duplicate	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Duplicate
				Sample Date:	10/14/2002	10/14/2002	10/15/2002	10/15/2002	10/15/2002	10/15/2002	10/15/2002	10/15/2002	10/15/2002
	Residential	Industrial		Sample Depth:	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'
TPH (8015B DRO) ^b	-	-	-	Units									
MOTOR OILS	-	-	-	mg/kg	10U	11U	7J	26	27	3J	19	7J	12U
PHC AS DIESEL FUEL	-	-	-	mg/kg	10U	11U	2J	5J	2J	10U	0.9J	12U	12U
PHC AS GASOLINE	-	-	-	mg/kg	11U	0.02J	10U	9.9U	0.02J	9.5U	0.05J	0.03J	0.03J
SVOCs (EPA Method 8270C) ^b													
BIS(2-ETHYLHEXYL)PHTHALATE	34,700	123,000	-	ug/kg	510U	540U	530U	70J	520U	520U	51J	620U	620U
DIETHYLPHTHALATE	48,882,000	100,000,000	-	ug/kg	510U	540U	530U	540U	520U	520U	610U	620U	140J
PHENOL	37,000,000	100,000,000	-	ug/kg	510U	902	530U	540U	520U	520U	610U	210J	250J
PAHs (PAH-SIM) ^b													
ANTHRACENE	21,896,121	100,000,000	-	ug/kg	25UJ	27UJ	26UJ	27UJ	26UJ	26UJ	31UJ	31UJ	31UJ
BENZO(A)ANTHRACENE	621	2,110	-	ug/kg	25UJ	27UJ	26UJ	12J	26UJ	26UJ	31UJ	31UJ	31UJ
BENZO(A)PYRENE	62	211	-	ug/kg	25U	27U	26U	15J	26U	26U	31U	31U	31U
BENZO(B)FLUORANTHENE	621	2,110	-	ug/kg	25UJ	27UJ	26UJ	34J	26UJ	26UJ	31UJ	31UJ	31UJ
BENZO(G,H,I)PERYLENE	-	-	-	ug/kg	25U	27U	26U	16J	26U	26U	31U	31U	31U
BENZO(K)FLUORANTHENE	378	1,283	-	ug/kg	25UJ	27UJ	26UJ	11J	26UJ	26UJ	31UJ	31UJ	31UJ
CHRYSENE	3,781	12,834	-	ug/kg	25U	27U	26U	24J	26U	26U	31U	31U	31U
DIBENZ(A,H)ANTHRACENE	62	211	-	ug/kg	25U	27U	26U	27U	26U	26U	31U	31U	31U
FLUORANTHENE	2,293,610	22,000,353	-	ug/kg	25U	27U	26U	14J	26U	26U	31U	31U	31U
INDENO(1,2,3-C,D)PYRENE	621	2,110	-	ug/kg	25U	27U	26U	27U	26U	26UJ	31UJ	31UJ	31UJ
PHENANTHRENE	-	-	-	ug/kg	25U	27U	26U	27U	26U	26U	31U	31U	31U
PYRENE	2,315,951	29,126,201	-	ug/kg	25U	27U	26U	17J	26U	26U	31U	31U	31U
Metals (EPA Method 6010B) ^a													
ALUMINUM	76,000	100,000	14,800	mg/kg	7860	8830	15800	8760	6870	9010	12100	13500	7860
ANTIMONY	31	410	3.06	mg/kg	6.1U	6.5U	6.3U	6.5U	6.2U	6.3U	7.4U	7.4U	7.5U
ARSENIC	0.39	1.6	6.86	mg/kg	2.2	2.3	4.2	2.8	2.5	3.2	3.2	3.5	2.2
BARIUM	5,400	67,000	173	mg/kg	71.6	88.6	145	96.8	77.7	110	103	111	74.4
BERYLLIUM	154	1,941	0.669	mg/kg	0.089UJ	0.12	0.21	0.43U	0.085	0.088UJ	0.11UJ	0.49U	0.5U
CADMIUM	1.7	7.4	2.35	mg/kg	0.6	0.76	0.5	0.31	0.58	0.55	0.76	0.42	0.39
CALCIUM	-	-	46,000	mg/kg	3160	16400	6000	4090	4690	7110	4430	6000	1990
CHROMIUM	211	448	26.9	mg/kg	8.6	8.6	14.3	8.4	7.3	9.6	12.7	12.2	12.2
COBALT	903	1,921	6.98	mg/kg	3.9	4.2	7.2	5.2	3.6	5.1	5.4	6.3	3.5
COPPER	3,129	40,877	10.5	mg/kg	4.9	4.9	9.4	5.7	4	6.5	7.9	6.4	6.8
IRON	23,463	100,000	18,400	mg/kg	10000	10600	18400	12300	9270	12700	14100	15400	7670
LEAD	150	750	15.1	mg/kg	2.7	3.5	6	6	2.5	4.9	12.7	3.5	4.3
MAGNESIUM	-	-	8,370	mg/kg	3390	3700	6900	4310	3150	4530	5040	5920	2180
MANGANESE	1,762	19,458	291	mg/kg	146J	168J	227J	181J	156J	196J	175J	225J	88.1J
MERCURY (EPA Method 7471A)	23.5	307	0.22	mg/kg	0.015	0.012	0.021	0.013	0.015	0.029	0.025	0.011	0.019
NICKEL	1,564	20,439	15.3	mg/kg	7.5	6.2	9.5	5.1	5.4	6.9	7	7.6	7.4
POTASSIUM	-	-	4,890	mg/kg	1940J	2170J	3600J	2740J	1900J	2440J	2730J	3270J	902J
SELENIUM	391	5,110	0.32	mg/kg	0.61U	0.65U	0.63U	0.65U	0.62U	0.63U	0.74U	0.74U	0.75U
SILVER	391	5,110	0.539	mg/kg	1UJ	1.1U	1.1U	1.1U	1UJ	1UJ	2	1.2UJ	1.2UJ
VANADIUM	547	7,154	71.8	mg/kg	24	24.6	40.4	27	20.5	27.7	31.6	35.1	21.5
ZINC	23,463	100,000	77.9	mg/kg	26.2	27.8	46.5	33	25.1	33.2	43.7	37.5	28.4

NOTES:

U = indicates the analyte was not detected at or above the stated limit.

UJ = indicates the analyte was not detected at or above the stated limit. The sample detection limit is an estimated value.

J = indicates an estimated value.

^a For metals, values in bold indicate concentrations exceeding both the residential and industrial PRGs, however their values are below the MCAS El Toro background concentrations (BNI 1996).

^b For organics, values in bold indicate concentrations exceeding the residential PRGs.

TPH = total petroleum hydrocarbons

EPA = Environmental Protection Agency

PRG = preliminary remediation goals

- = PRGs or background concentration values not established for this particular analyte.

Table 6-16: Quantification of Total 2,3,7,8-TCDD Concentrations for Surface Soil (0 - 1 feet bgs) - RSE Investigation

Parameter	WHO TEF Value	Sample ID:	LK047		LK056		LK068		LK077	
		Location ID:	HA11		HA14		HA18		HA21	
		Sample Type:	Regular		Regular		Regular		Regular	
		Sample Date:	10/10/2002		10/11/2002		10/11/2002		10/14/2002	
		Sample Depth:	0 - 1'		0 - 1'		0 - 1'		0 - 1'	
		Units	Lab	TEQ	Lab	TEQ	Lab	TEQ	Lab	TEQ
Dioxins/Furans (EPA Method 8290)										
1,2,3,4,6,7,8-HpCDD	1.00E-02	pg/g	0.947	0.0095	1.88	0.0188	2.41	0.0241	3.12	0.0312
1,2,3,4,6,7,8-HpCDF	1.00E-02	pg/g	0.417	0.0042	0.637	0.0064	1.36	0.0136	0.893	0.0089
1,2,3,4,7,8,9-HpCDF	1.00E-02	pg/g	0.116	0.0012	0.241 U	0.0012	0.239 U	0.0012	0.252 U	0.0013
1,2,3,4,7,8-HxCDD	1.00E-01	pg/g	0.0835	0.0084	0.241 U	0.0121	0.391	0.0391	0.252 U	0.0126
1,2,3,4,7,8-HxCDF	1.00E-01	pg/g	0.0944	0.0094	0.0617	0.0062	0.084	0.0084	0.0967	0.0097
1,2,3,6,7,8-HxCDD	1.00E-01	pg/g	0.171	0.0171	0.135	0.0135	0.353	0.0353	0.345	0.0345
1,2,3,6,7,8-HxCDF	1.00E-01	pg/g	0.101	0.0101	0.083	0.0083	0.122	0.0122	0.125	0.0125
1,2,3,7,8,9-HxCDD	1.00E-01	pg/g	0.184	0.0184	0.125	0.0125	0.469	0.0469	0.401	0.0401
1,2,3,7,8,9-HxCDF	1.00E-01	pg/g	0.193	0.0193	0.241 U	0.0121	0.33	0.0330	0.31	0.0310
1,2,3,7,8-PeCDD	1.00E+00	pg/g	0.0791	0.0791	0.241 U	0.1205	0.193	0.1930	0.169	0.1690
1,2,3,7,8-PeCDF	5.00E-02	pg/g	0.114	0.0057	0.241 U	0.0060	0.0744	0.0037	0.101	0.0051
2,3,4,6,7,8-HxCDF	1.00E-01	pg/g	0.134	0.0134	0.162	0.0162	0.177	0.0177	0.204	0.0204
2,3,4,7,8-PeCDF	5.00E-01	pg/g	0.141	0.0705	0.081	0.0405	0.239	0.1195	0.181	0.0905
2,3,7,8-TCDD	1.00E+00	pg/g	0.103	0.1030	0.0965 U	0.0483	0.107	0.1070	0.105	0.1050
2,3,7,8-TCDF	1.00E-01	pg/g	0.119	0.0119	0.0617	0.0062	0.137	0.0137	0.147	0.0147
OCDD	1.00E-04	pg/g	8.93	0.0009	17	0.0017	30	0.0030	40.3	0.0040
OCDF	1.00E-04	pg/g	1.97	0.0002	1.35	0.0001	6.87	0.0007	6.59	0.0007
Total HpCDDs	na	pg/g	1.9	na	3.8	na	5.71	na	6.32	na
Total HpCDFs	na	pg/g	0.417	na	1.39	na	3.05	na	2.32	na
Total HxCDDs	na	pg/g	0.604	na	0.413	na	1.2	na	1.23	na
Total HxCDFs	na	pg/g	0.916	na	1.92	na	2.55	na	2.03	na
Total PeCDDs	na	pg/g	0.294 U	na	0.0444	na	0.282	na	0.183	na
Total PeCDFs	na	pg/g	0.681	na	1.63	na	2.66	na	2.18	na
Total TCDDs	na	pg/g	0.226 U	na	0.178 U	na	0.139	na	0.216	na
Total TCDFs	na	pg/g	0.514	na	0.324	na	1.19	na	1.34	na
		Residential PRGs (pg/g)	Industrial PRGs (pg/g)							
Total 2,3,7,8-TCDDs		3.9	20		0.3822		0.3304		0.6721	
									0.5911	

Map 2

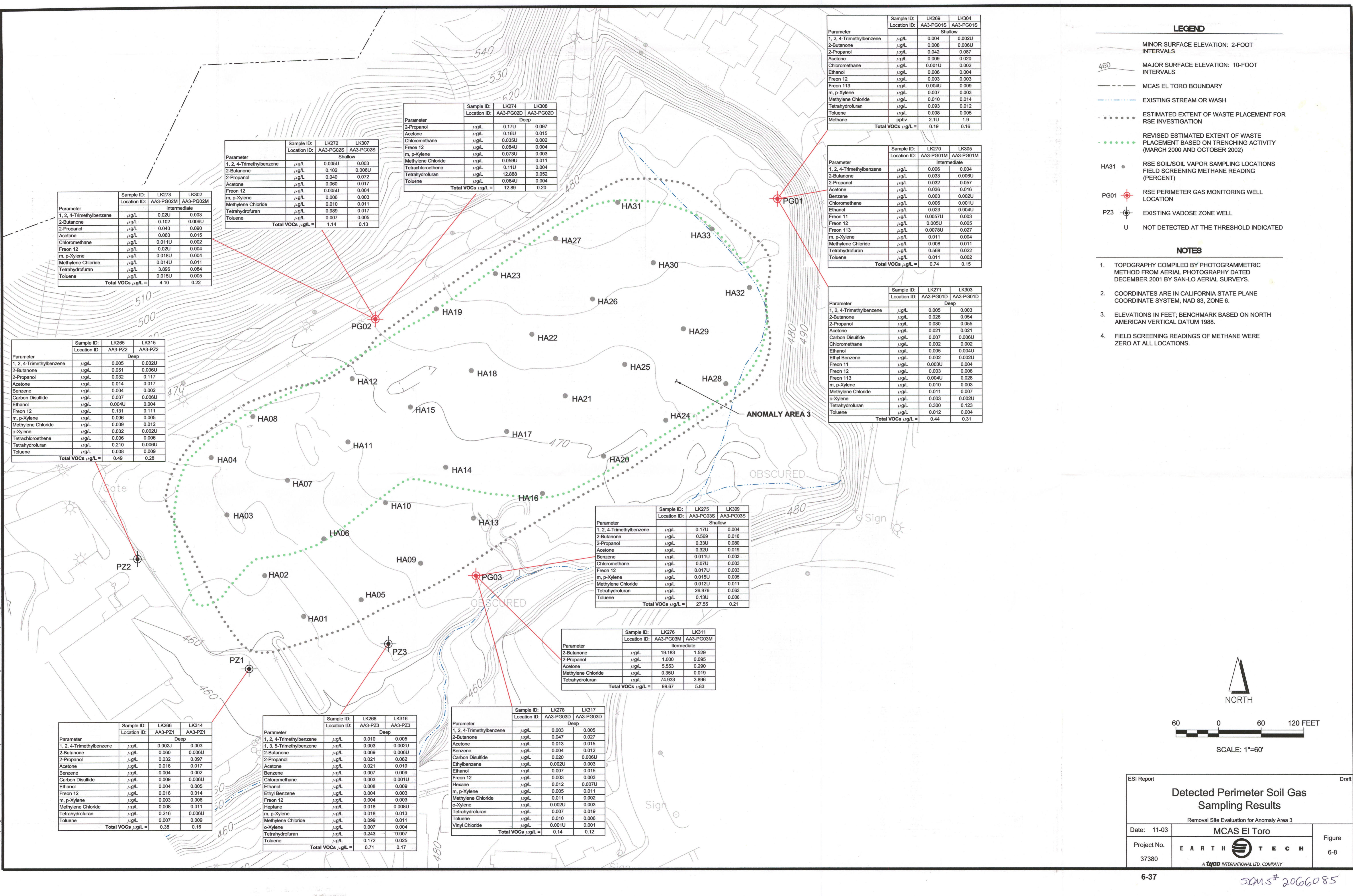


Table 6-16: Quantification of Total 2,3,7,8-TCDD Concentrations for Surface Soil (0 - 1 feet bgs) - RSE Investigation

Parameter	WHO TEF Value	Sample ID:		LK089		LK092		LK118		LK095	
		Location ID:		HA25		HA26		HA26		HA27	
		Sample Type:		Regular		Regular		Duplicate		Regular	
		Sample Date:		10/14/2002		10/14/2002		10/14/2002		10/14/2002	
		Sample Depth:		0 - 1'		0 - 1'		0 - 1'		0 - 1'	
		Units	Analysis	Lab	TEQ	Lab	TEQ	Lab	TEQ	Lab	TEQ
Dioxins/Furans											
1,2,3,4,6,7,8-HpCDD	1.00E-02	pg/g	8290	2.04	0.0204	9.92	0.0992	10.3	0.1030	1.55	0.0155
1,2,3,4,6,7,8-HpCDF	1.00E-02	pg/g	8290	0.579	0.0058	7.92	0.0792	6.59	0.0659	0.436	0.0044
1,2,3,4,7,8,9-HpCDF	1.00E-02	pg/g	8290	0.295 U	0.0015	0.329	0.0033	0.394 U	0.0020	0.261 U	0.0013
1,2,3,4,7,8-HxCDD	1.00E-01	pg/g	8290	0.364	0.0364	0.362	0.0362	0.475	0.0475	0.444 U	0.0222
1,2,3,4,7,8-HxCDF	1.00E-01	pg/g	8290	0.0851	0.0085	1.58	0.1580	1.34	0.1340	0.261 U	0.0131
1,2,3,6,7,8-HxCDD	1.00E-01	pg/g	8290	0.328	0.0328	1.87	0.1870	1.6	0.1600	0.345 U	0.0173
1,2,3,6,7,8-HxCDF	1.00E-01	pg/g	8290	0.0874	0.0087	7.68	0.7680	6.09	0.6090	0.261 U	0.0131
1,2,3,7,8,9-HxCDD	1.00E-01	pg/g	8290	0.475	0.0475	0.785	0.0785	0.923	0.0923	0.385 U	0.0193
1,2,3,7,8,9-HxCDF	1.00E-01	pg/g	8290	0.371	0.0371	0.903	0.0903	1.05	0.1050	0.261 U	0.0131
1,2,3,7,8-PeCDD	1.00E+00	pg/g	8290	0.0803	0.0803	0.515	0.5150	0.497	0.4970	0.261 U	0.1305
1,2,3,7,8-PeCDF	5.00E-02	pg/g	8290	0.113	0.0057	1.06	0.0530	0.775	0.0388	0.261 U	0.0065
2,3,4,6,7,8-HxCDF	1.00E-01	pg/g	8290	0.149	0.0149	14.7	1.4700	11.2	1.1200	0.261 U	0.0131
2,3,4,7,8-PeCDF	5.00E-01	pg/g	8290	0.156	0.0780	32.4	16.2000	26.5	13.2500	0.152	0.0760
2,3,7,8-TCDD	1.00E+00	pg/g	8290	0.118 U	0.0590	0.17	0.1700	0.229	0.2290	0.111 U	0.0555
2,3,7,8-TCDF	1.00E-01	pg/g	8290	0.156	0.0156	3.05	0.3050	2.12	0.2120	0.133	0.0133
OCDD	1.00E-04	pg/g	8290	19.8	0.0020	61.7	0.0062	79.8	0.0080	17	0.0017
OCDF	1.00E-04	pg/g	8290	4.13	0.0004	6.92	0.0007	7.46	0.0007	1.1	0.0001
Total HpCDDs	na	pg/g	8290	3.93	na	22	na	22.3	na	3.19	na
Total HpCDFs	na	pg/g	8290	1.45	na	15	na	12.8	na	0.436	na
Total HxCDDs	na	pg/g	8290	1.11	na	20.2	na	17.4	na	0.484 U	na
Total HxCDFs	na	pg/g	8290	1.8	na	201	na	156	na	0.442	na
Total PeCDDs	na	pg/g	8290	0.461	na	5.99	na	3.72	na	0.419 U	na
Total PeCDFs	na	pg/g	8290	1.76	na	752	na	563	na	1.56	na
Total TCDDs	na	pg/g	8290	0.123	na	0.313	na	1.53	na	0.346 U	na
Total TCDFs	na	pg/g	8290	1.35	na	346	na	294	na	0.586	na
Residential PRGs (pg/g)		Industrial PRGs (pg/g)									
Total 2,3,7,8-TCDDs		3.9		20		0.4546		20.2196		16.6741	
										0.4157	

Table 6-16: Quantification of Total 2,3,7,8-TCDD Concentrations for Surface Soil (0 - 1 feet bgs) - RSE Investigation

Parameter	WHO TEF Value	Sample ID:		LK101		LK107	
		Location ID:		HA29		HA31	
		Sample Type:		Regular		Regular	
		Sample Date:		10/15/2002		10/15/2002	
		Sample Depth:		0 - 1'		0 - 1'	
		Units	Analysis	Lab	TEQ	Lab	TEQ
Dioxins/Furans							
1,2,3,4,6,7,8-HpCDD	1.00E-02	pg/g	8290	1.92	0.0192	6.96	0.0696
1,2,3,4,6,7,8-HpCDF	1.00E-02	pg/g	8290	0.394	0.0039	1.35	0.0135
1,2,3,4,7,8,9-HpCDF	1.00E-02	pg/g	8290	0.253 U	0.0013	0.258 U	0.0013
1,2,3,4,7,8-HxCDD	1.00E-01	pg/g	8290	0.253 U	0.0127	0.258 U	0.0129
1,2,3,4,7,8-HxCDF	1.00E-01	pg/g	8290	0.0647	0.0065	0.138	0.0138
1,2,3,6,7,8-HxCDD	1.00E-01	pg/g	8290	0.117	0.0117	0.472	0.0472
1,2,3,6,7,8-HxCDF	1.00E-01	pg/g	8290	0.0829	0.0083	0.153	0.0153
1,2,3,7,8,9-HxCDD	1.00E-01	pg/g	8290	0.115	0.0115	0.377	0.0377
1,2,3,7,8,9-HxCDF	1.00E-01	pg/g	8290	0.253 U	0.0127	0.223	0.0223
1,2,3,7,8-PeCDD	1.00E+00	pg/g	8290	0.253 U	0.1265	0.115	0.1150
1,2,3,7,8-PeCDF	5.00E-02	pg/g	8290	0.253 U	0.0063	0.099	0.0050
2,3,4,6,7,8-HxCDF	1.00E-01	pg/g	8290	0.135	0.0135	0.252	0.0252
2,3,4,7,8-PeCDF	5.00E-01	pg/g	8290	0.154	0.0770	0.221	0.1105
2,3,7,8-TCDD	1.00E+00	pg/g	8290	0.109	0.1090	0.161	0.1610
2,3,7,8-TCDF	1.00E-01	pg/g	8290	0.0687	0.0069	0.144	0.0144
OCDD	1.00E-04	pg/g	8290	16.5	0.0017	59	0.0059
OCDF	1.00E-04	pg/g	8290	0.821	0.0001	4.11	0.0004
Total HpCDDs	na	pg/g	8290	4.35	na	13.7	na
Total HpCDFs	na	pg/g	8290	0.883	na	3.34	na
Total HxCDDs	na	pg/g	8290	0.521	na	2.66	na
Total HxCDFs	na	pg/g	8290	1.48	na	2.92	na
Total PeCDDs	na	pg/g	8290	0.141	na	0.254	na
Total PeCDFs	na	pg/g	8290	2.54	na	2.49	na
Total TCDDs	na	pg/g	8290	0.228 U	na	0.214	na
Total TCDFs	na	pg/g	8290	1.08	na	1.47	na
	Residential PRGs (pg/g)	Industrial PRGs (pg/g)					
Total 2,3,7,8-TCDDs	3.9	20		0.4286		0.6710	

NOTES:

U = Not detected at the threshold indicated
pg/g = picograms per gram
na = not available

WHO = World Health Organization
PRGs = Preliminary Remediation Goals

TEF = Toxicity Equivalent Factor
TEQ = Toxicity Equivalent Quotient

Table 6-17: Statistics of Detected Analytes – Surface Soil Sampling (0 – 1 feet bgs) – RSE Investigation

Analyte	Number of Samples Analyzed ^a	Number of Detections	Minimum and Maximum Concentrations (µg/kg)	Frequency of Detection (%)	Detections Above PRG
Motor oils (mg/kg)	37	18	3J–160	49	—
PHC as diesel fuel (mg/kg)	37	11	0.8J–15	30	—
PHC as gasoline (mg/kg)	37	27	0.0.2J–0.1J	73	—
Bis(2-ethylhexyl)phthalate	37	3	51J–65J	8	—
Diethylphthalate	37	1	140J	3	—
Anthracene	37	1	44J	3	—
Benzo(a)anthracene	37	7	7J–730J	19	1
Benzo(a)pyrene	37	3	10–1030J	8	1
Benzo(b)fluoranthene	37	5	8J–1790J	14	1
Benzo(g,h,i)perylene	37	4	7J–440J	11	—
Benzo(k)fluoranthene	37	4	7J–510J	11	1
Chrysene	37	4	8J–870	11	—
Dibenz(a,h)anthracene	37	1	97J	3	1
Fluoranthene	37	5	8J–1000	14	—
Indeno(1,2,3-c,d)pyrene	37	2	15J and 460J	5	—
Phenanthrene	37	2	9J and 290	5	—
Pyrene	37	5	11J–960	14	—
Total 2,3,7,8-TCDD (TEQ) (pg/g)	10	10	0.3304–20.21	100	2
Arsenic * (mg/kg)	37	37	1.6–4.7	100	37

NOTES:

^a Number of samples analyzed for the specified analyte, including duplicates, if any.

* All arsenic detections were below former MCAS El Toro background value of 6.86 mg/kg.

Table 6-18: Summary of Detected Analytes - Subsurface Soil (>1 - 35 feet bgs) - Previous Investigation

Parameter	PRGs		Background (0.95 Quantile)	Sample ID:	20242-1095	20242-1102	20242-1109	20242-1106	20242-1097	20242-1112	20242-1111	20242-1113	20242-1098	20242-1108	20242-1100	20242-1105	20242-1096	20242-1099
				Location ID:	AA3-H3-01	AA3-2E-01	AA3-4E-01	AA3-H6-01	AA3-H2-01	AA3-H4-01	AA3-H5-01	AA3-H4-01	AA3-H1-01	AA3-SE-02	AA3-H8-01	AA3-H7-01	AA3-1E-01	AA3-1E-02
				Sample Type:	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Duplicate	Regular	Regular	Regular	Regular	Regular	Regular
				Sample Date:	03/06/96	03/07/96	03/07/96	03/07/96	03/06/96	03/08/96	03/08/96	03/08/96	03/06/96	03/07/96	03/06/96	03/07/96	03/06/96	03/06/96
	Residential	Industrial		Sample Depth:	4.0'	4.0'	6.0'	6.0'	6.0'	7.0'	7.0'	7.5'	10.0'	10.0'	14.0'	18.0'	16.0'	22.0'
TPH (EPA Method 8015M)	-	-	-	Units	11 U	5600	170	10.7 U	150	42	12	79	10.9 U	15	10.6 U	150	160	61
TPH as Diesel				mg/kg														
VOCs (EPA Method 8260)	-	-	-	µg/kg	160 U	79 U	62 U	53 U	120 U	64 U	53 U	65 U	60 U	50 U	59 U	160 U	73 U	90 U
2-Butanone (MEK)	7,300,000	28,000,000	-	µg/kg	160 U	100	46 J	53 U	120 U	50 J	37 J	80	60 U	66	59 U	33 J	73 U	90 U
Acetone	1,600,000	6,200,000	-	µg/kg	16 U	7.9 U	6.2 U	5.3 U	12 U	6.4 U	5.3 U	1.7 J	6 U	5 U	5.9 U	16 U	7.3 U	9 U
Benzene	601	1,315	-	µg/kg	16 U	9.2	6.2 U	5.3 U	12 U	6.4 U	5.3 U	6.5 U	6 U	5 U	5.9 U	14 J	7.3 U	9 U
Methylene chloride	9,107	20,527	-	µg/kg	16 U	7.9 U	6.2 U	5.3 U	12 U	6.4 U	5.3 U	6.5 U	6 U	5 U	5.9 U	16 U	7.3 U	9 U
Styrene	1,700,000	1,700,000	-	µg/kg	16 U	7.9 U	6.2 U	5.3 U	12 U	6.4 U	5.3 U	6.5 U	6 U	5 U	5.9 U	16 U	7.3 U	9 U
SVOCs (EPA Method 8270)	-	-	-	µg/kg	360 U	21000 U	1800 U	350 U	1800 U	1800 U	270 J	1800 U	360 U	380 U	350 U	3500 U	1700 U	390 U
Benzo[a]anthracene	621	2,110	-	µg/kg	280 U	16000 U	190 U	35 U	1400 U	1300 U	230 J	1400 U	270 U	38 U	270 U	2700 U	140 J	39 U
Benzo[a]pyrene	62	211	-	µg/kg	360 U	21000 U	1800 U	350 U	1800 U	1800 U	440	1800 U	360 U	380 U	350 U	3500 U	1700 U	390 U
Benzo[b]fluoranthene	621	2,110	-	µg/kg	360 U	21000 U	1800 U	350 U	1800 U	1800 U	250 J	1800 U	360 U	380 U	350 U	3500 U	1700 U	390 U
Chrysene	62,000	211,000	-	µg/kg	360 U	21000 U	1800 U	96 J	1800 U	1800 U	260 J	1800 U	360 U	380 U	350 U	3500 U	1700 U	390 U
Diethyl phthalate	48,882,478	100,000,000	-	µg/kg	360 U	21000 U	1800 U	350 U	1800 U	1800 U	600	1800 U	360 U	380 U	350 U	3500 U	1700 U	390 U
Fluoranthene	2,293,610	22,000,353	-	µg/kg	360 U	21000 U	1800 U	35 U	1800 U	1800 U	81	1800 U	360 U	38 U	350 U	3500 U	63 J	39 U
Indeno[1,2,3-cd]pyrene	621	2,110	-	µg/kg	360 U	21000 U	1800 U	350 U	1800 U	1800 U	140 J	1800 U	360 U	380 U	350 U	3500 U	1700 U	390 U
Phenanthrene	-	-	-	µg/kg	360 U	21000 U	1800 U	350 U	1800 U	1800 U	460	1800 U	360 U	380 U	350 U	3500 U	1700 U	390 U
Pyrene	2,315,951	29,126,201	-	µg/kg	360 U	21000 U	1800 U	350 U	1800 U	1800 U	460	1800 U	360 U	380 U	350 U	3500 U	1700 U	390 U
Metals (EPA Method 6010B) ^a	-	-	-	mg/kg	11 UJ	10.5 U	11.2 U	10.7 U	11 UJ	10.7 U	10.6 U	10.9 U	10.9 UJ	11.4 U	10.6 UJ	10.7 U	46 J	12 UJ
Antimony	31	410	3.06	mg/kg	11 UJ	10.5 U	11.2 U	10.7 U	11 UJ	10.7 U	10.6 U	10.9 U	10.9 UJ	11.4 U	10.6 UJ	10.7 U	46 J	12 UJ
Arsenic	0.39	1.6	6.86	mg/kg	3.05	2.12	2.49	1.81	4.63	4.59	2.85	4.35	3.45	3.23	3.98	1.85	211	4.04
Barium	5,400	67,000	173	mg/kg	112	79.4	76	73	101	104	62.3	106	98.3	83.5	79.7	83.9	360	156
Beryllium	154	1,941	0.669	mg/kg	.459 U	.294 U	.298 U	.219 U	.361 U	.459 U	.215 U	.407 U	.419 U	.391 U	.533 U	.253 U	.63 U	.558 U
Cadmium	1.7	7.4	2.35	mg/kg	1.1 U	1.05 U	1.12 U	1.07 U	1.1 U	1.07 U	1.06 U	1.09 U	1.09 U	1.14 U	1.06 U	1.07 U	2.42	1.2 U
Chromium	211	448	26.9	mg/kg	10.2	10.4	7.04	4.4	13.2	15.8	12.9	16.9	12.3	9.16	13.2	6.88	53.1	14.9
Cobalt	903	1,921	6.98	mg/kg	3.73	5.33	3.09	2.54	4.18	5.8	2.97	4.52	4.32	3.5	6.1	2.92	72.8	6.74
Copper	3,129	40,877	10.5	mg/kg	6.56	10.7	6.48	3.04	9.28	12.7	5.82	12.6	6.56	6.2	11.3	4.35	2040	12.4
Lead	150	750	15.1	mg/kg	5.47	9.36	9.72	2.22	12.4	14.7	3.87	11.9	3.58	3.56	3.4	6.47	677	4.42
Manganese	1,762	19,458	291	mg/kg	211 J	231	156	144	214 J	250	145	213	181 J	123	125 J	149	1350 J	270 J
Molybdenum	390	5100	NE	mg/kg	2.2 UJ	2.1 U	2.24 U	2.14 U	2.19 UJ	2.15 U	2.13 U	2.17 U	2.19 UJ	2.29 U	2.13 J	2.14 U	490 J	3.2 UJ
Nickel	1,564	20,439	15.3	mg/kg	7.14	13.7	5.03	2.14 U	8.79	11.6	7.98	10.3	8.07	5.15	9.71	4.92 U	25.4	10.7
Selenium	391	5,110	0.32	mg/kg	1.1 U	1.05 U	1.12 U	1.07 U	1.1 U	1.07 U	1.06 U	1.09 U	1.09 U	1.14 U	1.06 U	1.07 U	3.4	1.2 U
Thallium	5.2	67	0.42	mg/kg	1.19 U	1.05 U	1.12 U	1.07 U	1.32 U	1.07 U	1.06 U	1.09 U	1.09 U	1.14 U	1.06 U	1.07 U	3.98	1.2 U
Vanadium	547	7,154	71.8	mg/kg	27.4	35.6	19.7	16.9	27.3	29.5	18	26.9	32.6	22.8	37.9	20	38.1	43.4
Zinc	23,463	100,000	77.9	mg/kg	37.7 J	45.9 J	35.9	26.2	43 J	50.7	26.2	45.9	36.4 J	32.5	34.1 J	27.5 J	6030 J	88 J
Dioxins/Furans (EPA Method 8290)	-	-	-	pg/g	4.3 J	NA	39	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HPCDD	-	-	-	pg/g	1.7 U	NA	2.7 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HPCDF	-	-	-	pg/g	0.72 U	NA	0.99 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-HPCDF	-	-	-	pg/g	0.64 U	NA	0.86 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-TCDD	-	-	-	pg/g	0.41 U	NA	0.68 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-TCDF	-	-	-	pg/g	0.68 U	NA	1.5 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-TCDD	-	-	-	pg/g	0.39 U	NA	0.66 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-TCDF	-	-	-	pg/g	0.91 U	NA	1.1 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-TCDD	-	-	-	pg/g	0.77 U	NA	0.80 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-TCDF	-	-	-	pg/g	0.82 U	NA	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PECDD	-	-	-	pg/g	0.49 U	NA	0.74 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PECDF	-	-	-	pg/g	0.42 U	NA	0.71 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-TCDF	-	-	-	pg/g	0.48 U	NA	0.73 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-PECDF	-	-	-	pg/g	0.79 U	NA	0.78 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	3.9	27	-	pg/g	0.42 U	NA	0.66 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDF	-	-	-	pg/g	8.6	NA	66	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HCDDs (total)	-	-	-	pg/g	1.8	NA	6.8 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HPCDFs (total)	-	-	-	pg/g	0.88 U	NA	4.1 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HCDDs (total)	-	-	-	pg/g	0.77 U	NA	1.6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HCDFs (total)	-	-	-	pg/g	40	NA	330 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDD	-	-	-	pg/g	5.9 J	NA	10 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDF	-	-	-	pg/g	0.82 U	NA	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PECDDs (total)	-	-	-	pg/g	0.77 U	NA	2.0 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PECDFs (total)	-	-	-	pg/g	0.79 U	NA	0.78 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCDDs (total)	-	-	-	pg/g	0.54 U	NA	0.66 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCDFs (total)	-	-	-	pg/g	0.048	NA	0.424	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TEQ (Total 2,3,7,8-TCDD)	3.9	27	-	pg/g	0.048	NA	0.424	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6-18: Summary of Detected Analytes - Subsurface Soil (>1 - 35 feet bgs) - Previous Investigation

Parameter	PRGs		Background (0.95 Quantile)	Sample ID:	20242-1101	20242-1103	20242-1110	20242-1114	20242-1107	20242-1117	20242-1118	20242-1104	20242-1116	20242-1115
				Location ID:	AA3-1E-03	AA3-2E-02	AA3-3E-01	AA3-3E-02	AA3-5E-01	AA3-5E-03	AA3-5E-03	AA3-6E-01	AA3-7E-01	AA3-3E-03
				Sample Type:	Regular	Regular	Regular	Regular	Regular	Regular	Duplicate	Regular	Regular	Regular
				Sample Date:	03/06/96	03/07/96	03/08/96	03/08/96	03/07/96	03/09/96	03/09/96	03/07/96	03/08/96	03/08/96
	Residential	Industrial		Sample Depth :	20.0'	22.0'	22.0'	22.0'	22.0'	22.0'	22.5'	22.0'	22.0'	35.0'
TPH (EPA Method 8015M)	-	-	-	Units	12 U	130	63	110	13	220	130	260	370	1100
TPH as Diesel				mg/kg										
VOCs (EPA Method 8260)														
2-Butanone (MEK)	7,300,000	28,000,000	-	µg/kg	78 U	66 U	67 U	52 J	52 U	10 J	13 J	100 U	52 U	11 J
Acetone	1,600,000	6,200,000	-	µg/kg	78 U	50 J	40 J	230 J	46 J	31 J	98	100 J	52 U	77
Benzene	670	1,500	-	µg/kg	7.8 U	6.6 U	6.7 U	6.3 U	5.2 U	5.9 U	5.9 U	10 U	5.2 U	5.9 U
Methylene chloride	8,900	21,000	-	µg/kg	7.8 U	7.7	6.7 U	6.3 U	5.2 U	3.2 J	34	11	3 J	2.7 J
Styrene	1,700,000	1,700,000	-	µg/kg	7.8 U	6.6 U	6.7 U	6.3 U	5.2 U	5.9 U	5.9 U	10 U	32	5.9 U
SVOCs (EPA Method 8270)														
Benzo[a]anthracene	621	2,110	-	µg/kg	400 U	2000 U	400 U	3800 U	390 U	780 U	390 U	3800 U	10000 U	390 U
Benzo[a]pyrene	62	211	-	µg/kg	300 U	1500 U	310 U	2900 U	290 U	590 U	290 U	2900 U	1000 U	290 U
Benzo[b]fluoranthene	621	2,110	-	µg/kg	400 U	2000 U	400 U	3800 U	390 U	780 U	390 U	3800 U	10000 U	390 U
Chrysene	62,000	211,000	-	µg/kg	400 U	2000 U	400 U	3800 U	390 U	780 U	390 U	3800 U	10000 U	390 U
Diethyl phthalate	48,882,478	100,000,000	-	µg/kg	100 J	2000 U	400 U	3800 U	390 U	780 U	390 U	3800 U	10000 U	390 U
Fluoranthene	2,293,610	22,000,353	-	µg/kg	400 U	2000 U	400 U	3800 U	390 U	780 U	390 U	3800 U	10000 U	390 U
Indeno[1,2,3-cd]pyrene	621	2,110	-	µg/kg	400 U	2000 U	400 U	3800 U	390 U	780 U	390 U	3800 U	1000 U	390 U
Phenanthrene	-	-	-	µg/kg	400 U	2000 U	400 U	3800 U	390 U	780 U	390 U	3800 U	10000 U	390 U
Pyrene	2,315,951	29,126,201	-	µg/kg	400 U	2000 U	400 U	3800 U	390 U	780 U	390 U	3800 U	10000 U	390 U
Metals (EPA Method 6010B) ^a														
Antimony	31	410	3.06	mg/kg	12 UJ	12.1 U	12.2 U	11.5 U	11.7 U	11.8 U	11.7 U	11.5 U	10.4 U	11.7 U
Arsenic	0.39	1.6	6.86	mg/kg	6.78	6.47	4.92	6.56	7.74	3.25	3.05	2.99	2.6	4.82
Barium	5,400	67,000	173	mg/kg	156	101	86.8	100	68.5	88.6	93.5	95.5	55.5	98.1
Beryllium	154	1,941	0.669	mg/kg	.618 U	.419 U	.35 U	.467 U	.378 U	.357	.383	.302 U	.29	.499
Cadmium	1.7	7.4	2.35	mg/kg	1.2 U	1.35	1.22 U	1.15 U	1.17 U	1.18 U	1.17 U	1.15 U	1.84	1.17 U
Chromium	211	448	26.9	mg/kg	21.1	23.8	16	14.1	8.3	7.29	8.08	9.34	10.8	11.2
Cobalt	903	1,921	6.98	mg/kg	4.97	4.03	2.21	4.31	3.43	3.27	3.6	3.55	6.97	4.36
Copper	3,129	40,877	10.5	mg/kg	7.9	17.2	4.3	25.8	4.79	7.48	7.12	6.92	11.1	7.91
Lead	150	750	15.1	mg/kg	5.1	24.6	2.96	6.13	3.7	4.73	3.93	5.53	122	4.39
Manganese	1,762	19,458	291	mg/kg	185 J	175	124	169	91.2	138	136	168	181	107
Molybdenum	390	5100	NE	mg/kg	2.4 UJ	7.81	2.45 U	2.3 U	2.35 U	2.37 U	2.35 U	2.29 U	2.07 U	2.34 U
Nickel	1,564	20,439	15.3	mg/kg	11.5	9.87	6.61	8.51	5.32	7.28	7.4	6.79	8.26	7.12
Selenium	391	5,110	0.32	mg/kg	1.2 U	1.21 U	1.22 U	1.15 U	1.17 U	1.18 U	1.17 U	1.15 U	1.04 U	1.17 U
Thallium	5.2	67	0.42	mg/kg	1.22 U	1.21 U	1.22 U	1.15 U	1.17 U	1.18 U	1.17 U	1.15 U	1.04 U	1.17 U
Vanadium	547	7,154	71.8	mg/kg	43.2	39.7	25.8	33.8	20.8	20.6	22.6	25.9	21.6	26.8
Zinc	23,463	100,000	77.9	mg/kg	52.6 J	72 J	34.7	37.6	21.9	37.5	34.7	39.2 J	146	32.5
Dioxins/Furans (EPA Method 8290)														
1,2,3,4,6,7,8-HPCDD	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HPCDF	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-HPCDF	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-HCDD	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-HCDF	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-HCDD	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-HCDF	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-HCDD	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-HCDF	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PECDD	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PECDF	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-HCDF	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-PECDF	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	3.9	27	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDF	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HPCDDs (total)	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HPCDFs (total)	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HCDDs (total)	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HCDFs (total)	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDD	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDF	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PECDDs (total)	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PECDFs (total)	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCDDs (total)	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCDFs (total)	-	-	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TEQ (Total 2,3,7,8-TCDD)	3.9	27	-	pg/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:

indicates the analyte was not detected at or above the stated limit.

indicates the analyte was not detected at or above the stated limit. The sample detection limit is an estimated value.

J = indicates an estimated value.

mg/kg = milligrams per kilogram

µg/kg = micrograms per kilogram

pg/g = picogram per per kilogram

NE = not established

NA = not analyzed

TPH = total petroleum hydrocarbons

EPA = Environmental Protection Agency

PRG = preliminary remediation goals

VOCs = volatile organic compounds

SVOCs = semivolatile organic compounds

AA3 = Anomaly Area 3

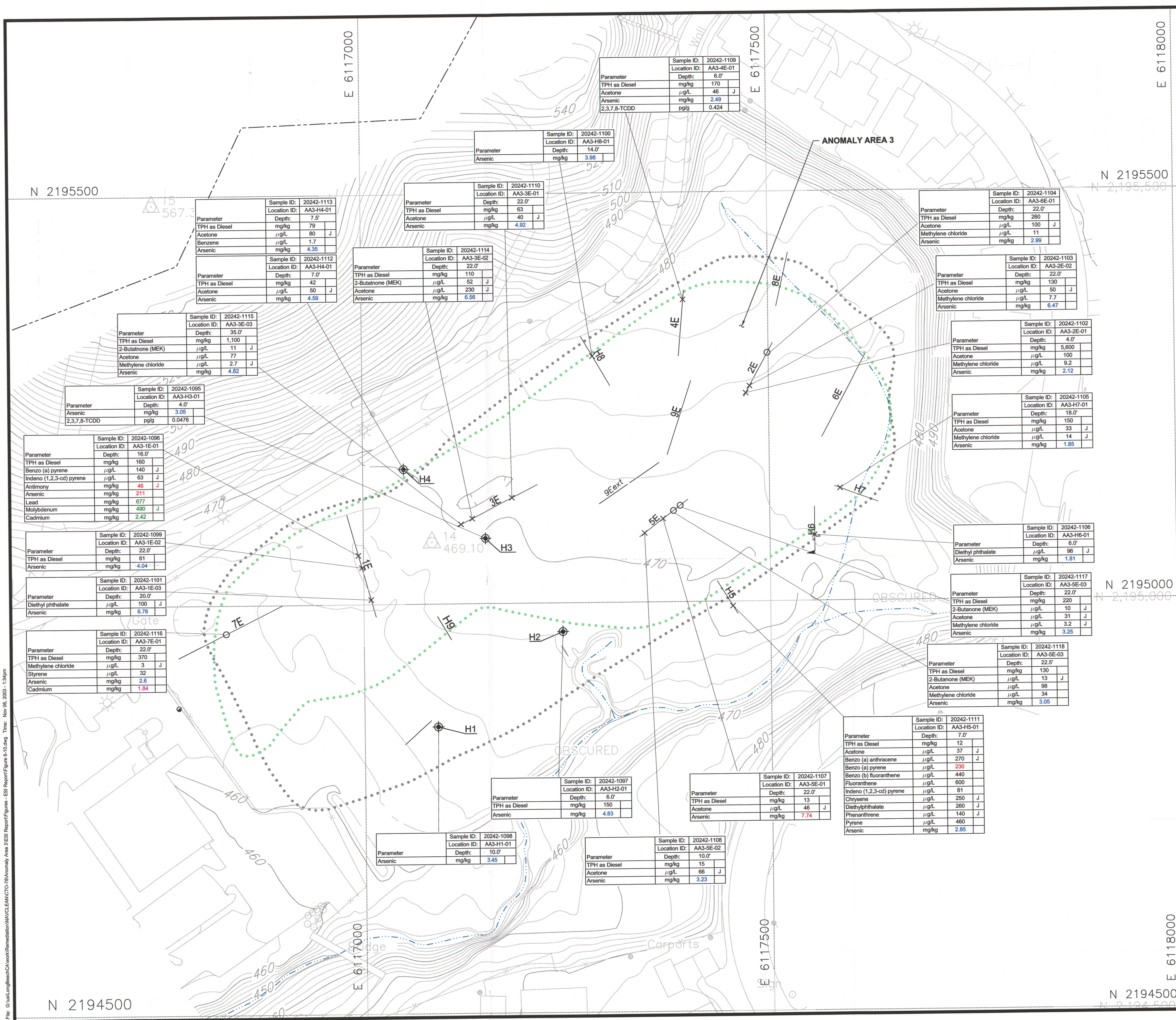
RSE = Removal Site Evaluation

- = PRGs or background concentration values not established for this particular analyte.

^aFor metals,
Values in **bold and in highlighted cells** indicate concentrations above the MCAS El Toro background concentrations (BNI 1996) and their respective residential and industrial PRGs.
Values in ***bold and italicized*** indicate concentrations exceeding the MCAS El Toro background concentrations (BNI 1996) and residential PRGs, however their values are below the industrial PRGs.
Values in **bold** indicate concentrations above their respective residential and industrial PRGs, but below the MCAS El Toro background concentrations (BNI 1996).
Values underlined indicate concentrations above the residential PRGs only, but below the MCAS El Toro background concentrations (BNI 1996) and industrial PRGs.

^b Value in **bold and in highlighted cell** indicate that the particular analyte has concentrations exceeding its residential and industrial PRGs.

Map 3



the previous subsurface sampling was not designed in order to fully characterize the site - it was designed in order to design cover

NORTH

60 0 60 120 FEET

SCALE: 1"=60'

ESI Report		Draft	
Detected Subsurface Soil Sampling Results - Previous Sampling Event			
Removal Site Evaluation for Anomaly Area 3			
Date: 11-03	MCAS El Toro		Figure 6-10
Project No. 37380	EARTH TECH		
A tyco INTERNATIONAL LTD. COMPANY			

Table 6-19: Statistics of Detected Analytes – Subsurface Soil Sampling (greater than 1 – 35 feet bgs) – Previous Investigation

Analyte	Number of Samples Analyzed ^a	Number of Detections	Minimum and Maximum Concentrations (µg/kg)	Frequency of Detection (%)	Detections Above PRGs	Detections Above former MCAS El Toro Background Concentrations and PRGs
TPH as Diesel (mg/kg)	24	19	12–5600	79	—	—
2-Butanone (MEK)	24	4	11J–52	17	—	—
Acetone	24	15	31J–230J	21	—	—
Benzene	24	1	1.7J	4	—	—
Methylene chloride	24	8	2.7J–34	33	—	—
Styrene	24	1	32	4	—	—
Benzo[a]anthracene	24	1	270J	4	—	—
Benzo[a]pyrene	24	2	140J and 230	8	1	—
Benzo[b]fluoranthene	24	1	440	4	—	—
Chrysene	24	1	250J	4	—	—
Diethyl phthalate	24	2	100J and 260J	8	—	—
Fluoranthene	24	1	600	4	—	—
Indeno[1,2,3-cd]pyrene	24	2	63J and 81	8	—	—
Phenanthrene	24	1	140J	4	—	—
Pyrene	24	1	460	4	—	—
Antimony (mg/kg)	24	1	46 J	4	1	1
Arsenic (mg/kg)	24	24	1.81–211	100	24	2
Cadmium (mg/kg)	24	3	1.35–2.42	13	2	1
Lead (mg/kg)	24	24	2.22–677	100	1	1
Molybdenum (mg/kg)	24	3	2.13J–490J	13	1	1
Total 2,3,7,8-TCDD (pg/g)	2	2	0.0476–0.424	100	—	—

Notes: ^a Number of samples analyzed for the specified analyte, including duplicates, if any.

The frequency of all SVOC detections was less than 8 percent of the collected samples. Only one SVOC (benzo[a]pyrene) in only one sample (20242-1111) out of 24 samples exceeded its residential PRG. The two samples analyzed for dioxins and furans reported total 2,3,7,8-TCDD (TEQ) concentrations of 0.05 pg/g and 0.42 pg/g, respectively. Both detections are below the 2,3,7,8-TCDD residential PRG of 3.9 pg/g.

In the case of metals, Table 6-19 presents metals that exceed the PRG values and former MCAS El Toro background concentrations. The metals not listed in Table 6-19 but detected include copper (9 detections; 10.7 to 2,040 mg/kg), lead (3 detections; 24.6 to 677 mg/kg), and zinc (2 detections; 146 mg/kg and 6,030J mg/kg).

The maximum concentrations of all the metals that were detected above background levels and residential PRGs (antimony, arsenic, cadmium, lead, and molybdenum) are reported from sample 20242-1096 collected from trench 1E at 16 feet bgs. This sample also had maximum number of metals that exceeded the background (Table 6-18). However, it should be noted that samples collected further deep within the trench 1E at 22 feet bgs (20242-1099) and 20 feet bgs (20242-1101) reported metal concentrations below background and consistent with rest of the subsurface samples collected at the site. As can be seen in Table 6-19, only 2 in 24 samples for arsenic and only 1 in

24 samples for antimony, cadmium, lead, and molybdenum exceeded both background concentrations and PRGs.

6.4.3 Summary of Soil Sampling Results

Based on the results of two trenching activities (previous and RSE investigations) and subsurface exploration during soil gas survey, it was confirmed that there is approximately 2 to 5 feet of soil cover below which the debris was encountered. The purpose of the surface soil sampling was to quantify the risk due to chemical contamination in surface soil (existing soil cover) to human and ecological receptors at the site. The purpose of subsurface soil sampling was to help adequately characterize the nature of the debris and evaluate the risk of adverse human health and ecological effects at this site.

For surface soils (0 – 1 feet bgs), no VOCs were detected in any of the surface soil samples (37 samples at 33 locations). Petroleum hydrocarbons were detected at very low concentrations ranging from 0.02J mg/kg to 160 mg/kg. Only 5 SVOCs (benzo(a)anthracene, benzo(b)-fluoranthene, benzo(k)fluoranthene, B[a]P and dibenz(a,h) anthracene) at only one location (HA15) out of 33 surface soil sampling locations exceed residential PRGs. 2,3,7,8-TCDD exceeded its residential PRG at only one out of nine surface soil sampling locations (HA26) analyzed for dioxin and furan. All metals that were analyzed were less than either background or PRG concentrations at all 33 surface soil sampling locations. It can be concluded that metals are detected in the surface soils at a frequency that reflects their natural variation in the soils.

In subsurface soil samples, with the exception of common laboratory contaminants such as acetone, 2-butanone and methylene chloride, the frequency of detection of the VOCs and SVOCs is less than 4 percent and 8 percent, respectively. None of the detected VOCs exceeds residential or industrial PRGs. Only one SVOC (benzo[a]pyrene) in only one sample (20242-1111) out of 24 samples exceeded its residential PRG. Asbestos and perchlorate were not detected in any of the subsurface soil samples. Of 24 samples analyzed, only 19 samples had detected concentrations of diesel range petroleum hydrocarbons. Of these 19 detections, only two had concentrations of 1,100 mg/kg and 5,600 mg/kg; all others ranged from 12 to 370 mg/kg. The maximum concentrations of all the metals that were detected above background levels and residential PRGs (antimony, arsenic, cadmium, lead, and molybdenum) and maximum number of metals that exceeded the background are reported from one sample (20242-1096) collected from trench 1E at 16 feet bgs. Metal analytical results indicate high variability in concentrations of metals at the site, which is not uncommon and can be attributed to natural conditions. Only 2 in 24 samples for arsenic and only 1 in 24 samples for antimony, cadmium, lead, and molybdenum exceeded both background concentrations and PRGs.

Based on these sampling results and the physical characterization of areas that contained significant volumes of construction debris supports the previous conclusions that only inert construction-related debris were placed at AA 3. In addition, characterization of the near-surface soils does not show that significant levels of contamination exist. This data, coupled with the human health and ecological risk assessments, can be used to develop a response action that is protective of human and ecological receptors.

6.5 GROUNDWATER

The RSE DQO decision rule #4 of this RSE recommended additional groundwater sampling if the groundwater was not adequately characterized. This recommendation will resolve project question #4.

Four wells, (MW01 through MW04) existed at the site before the RSE investigation. Wells MW05 through MW10, including dual nested wells at MW09, were installed as part of the RSE investigation. Monitoring wells MW03 and MW06 were installed as upgradient wells and MW01, MW02, and MW10 (screened in bedrock) were installed as down gradient wells. Sample results from wells MW02, MW04, and MW10 were used to characterize the groundwater from the deepest section of the fill (south and northeast of the intersection of cross section lines AA 3-2-2' and AA 3-12-12' [Figure 5-7]).

Dual nested wells MW09A and MW09B were installed close to the debris between existing well MW01 and well MW08 to verify if additional aquifers are present at the site and to evaluate if there is any radial migration of leachate from the lowest portion of the debris placement area. The well locations are presented on Figure 4-1.

As part of previous sampling events (4 November 1999 and 20 April 2000), the existing four wells (MW01, MW02, MW03, and MW04) were gauged and sampled. The samples were analyzed for petroleum hydrocarbons, VOCs, SVOCs, metals, perchlorate, nitrates, and radionuclides. A summary of detected analytes from these previous sampling events is presented in Table 6-20.

6.5.1 November 1999 Groundwater Sampling Event

Five groundwater samples (including a duplicate at MW01) were collected during the November 1999 sampling event. A stray detection (less than its MCL of 13 µg/L) of methyl tert-butyl ether (MTBE) was reported from the sample and its duplicate (2.6J and 2.5J µg/L) collected from well MW01 during the November 1999 sampling event. Selenium was the only metal that was detected at a concentration (50.3 µg/L) slightly exceeding its MCL value (50 µg/L) in well MW03. Gross alpha concentrations from all wells exceeded the MCL value of 15 pCi/L.

6.5.2 April 2000 Groundwater Sampling Event

Four samples were collected during April 2000 sampling event. The MTBE detection in the November 1999 sampling event from well MW01 was not confirmed in the April 2000 sampling event. Chromium was detected in well MW02 (357 µg/L) above its MCL value (50 µg/L). Of all the radionuclides detected, only gross alpha and uranium (MCL of 20 pCi/L) concentrations exceeded the MCL value in all wells.

6.5.3 December 2002 Sampling Event – Round 1 RSE Investigation

Twelve groundwater samples (including one duplicate from well MW10) were analyzed for petroleum hydrocarbons, VOCs, SVOCs, metals, and perchlorate (Table I-1 of Appendix I). A complete data set for Round 1 groundwater sampling is presented in Table I-2 of Appendix I. Even though the previous groundwater samples had radionuclide concentrations exceeding the PRG values, radionuclide analyses were not conducted for groundwater because Phase I and II radionuclide evaluations concluded that the radionuclides in the groundwater naturally occurring, and not anthropogenic, and there was no evidence that the gross alpha and gross beta emissions detected at former MCAS El Toro were caused by Marine Corps activities. Therefore, no further evaluation of the origin of the radionuclides in groundwater was recommended. The December 2002 groundwater samples were collected as part of the first sampling event of four events proposed as part of the RSE investigation. Detected analytes from this sampling event are presented in Table 6-21.

No VOCs were detected in any of the wells sampled with an exception of a stray detection of chloroform (0.61 µg/L compared to its MCL of 100 µg/L) at MW08. Random and very low detections (much lower than regulatory threshold of tap water PRGs) of diethylphthalate (non-detect

to 2J µg/L in MW01 and MW08), m/p-creosol (non-detect to 6J µg/L in MW02), and phenol (non-detect to 12 µg/L in MW02) were reported. Groundwater sample collected from well MW01 had nickel concentrations (105 µg/L) exceeding the MCL value of 100 µg/L. Chromium concentrations in MW02, exceeding the MCL value in April 2000 sampling event is confirmed in December 2002 sampling event (296 µg/L). Motor oils (0.37 milligrams per liter [mg/L]) and petroleum hydrocarbons as diesel fuel (1.3 mg/L) were the other analytes reported from this well; it must be noted that a dead rodent carcass was removed from this well prior to sampling. No other well reported motor oils or petroleum hydrocarbons as diesel, except for a trace detection (0.008J mg/L) of diesel fuel in MW08.

6.5.4 March 2003 Sampling Event – Round 2 RSE Investigation

The March 2003 groundwater samples were collected as part of the second sampling event of four events proposed as part of the RSE investigation. Fourteen groundwater samples (including three duplicates from wells MW01, MW02, and MW08) were analyzed for petroleum hydrocarbons, VOCs, SVOCs, metals, and perchlorate (Table 3 of Appendix I). Detected analytes from this sampling event are presented in Table 6-21. The results are consistent with the previous sampling events.

6.5.5 Summary of Groundwater Sampling Results

Figure 6-11 presents the results of November 1999, April 2000, December 2002, and March 2003 groundwater sampling events. The statistics on the groundwater samples from these sampling events, including duplicates and information of regulatory threshold value exceedance is presented in Table 6-22. The detected VOCs from all sampling events are MTBE (2 detections in 1999 at one well [including a duplicate] less than the MCL) and chloroform (1 detection less than the MCL), and detected SVOCs are m/p-cresol (1 detection less than the tap water PRG), diethylphthalate (2 detections less than the tap water PRG), and phenol (1 detection less than the tap water PRG). Single detection of motor oils and diesel fuel petroleum hydrocarbons was recorded in the December 2002 groundwater sample from well MW02, as well as one trace detection of diesel in MW08. From all sampling events, the only metals that were detected above their regulatory threshold (MCLs) were, chromium (2 detection above its MCL in 2000 and 2002), nickel (1 detection above its MCL in 2002) and selenium (1 detection above its MCL in 1999).

Figures 5-8, 5-9, and 5-10 present the cross sections showing the width and depth of debris placement at the site. The water level gauging information (December 2002 depth-to-water information) is also shown on these cross sections. In these cross sections, the groundwater surface appears to be above or within close proximity to the pre-waste placement topographical elevation, which might indicate that the groundwater is in contact with the debris placed at the site. The physical and chemical characterization of debris was not performed at depths greater than 22 feet bgs (with an exception of 35 feet bgs at one location). Therefore, it is uncertain whether debris that could be a potential source of chemical contamination for the groundwater were placed at depths greater than approximately 22 feet bgs. However, even though there is a complete groundwater pathway for contaminant migration due to the close proximity of groundwater to the pre-waste placement topograph, the analytical results of all the groundwater samples collected from the periphery of the debris placement boundary and the concentrations, low frequency of detection and spatial distribution of groundwater constituents indicate that there is no impact to the groundwater from the site. The results indicate that most of the debris placed at the site is inert construction debris and that the site did not receive any debris that could cause chemical contamination in the groundwater.

Table 6-20: Summary of Detected Analytes - Groundwater Sampling - AA3 Previous Sampling Events

Parameter	Regulatory Threshold Concentrations (µg/L)	Sample ID:	20242-987	20242-990	20242-1123	20242-984	20242-1124	20242-989	20242-1120	20242-981	20242-1122
		Location ID:	AA3-MW-01	AA3-MW-01	AA3-MW-01	AA3-MW-02	AA3-MW-02	AA3-MW-03	AA3-MW-03	AA3-MW-04	AA3-MW-04
		Sample Type:	Regular	Duplicate	Regular	Regular	Regular	Regular	Regular	Regular	Regular
		Sample Date:	11/03/99	11/03/99	04/19/00	11/02/99	04/19/00	11/03/99	04/18/00	11/01/99	04/19/00
VOCs (EPA 8260A)	13 ^c	Unit									
Methyl tert-butyl ether (MTBE)		µg/L	2.6 J	2.5 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Metals (EPA 6010)											
Arsenic	50 ^c	µg/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	26.4	23.2
Chromium	50 ^c	µg/L	50 U	50 U	50 U	50 U	357	50 U	50 U	50 U	50 U
Manganese	50 ^d	µg/L	80.2	77.1	20 U	259	433	20.9	20 U	48.1	20 U
Selenium	50 ^c	µg/L	5.47 J	9.32 J	12.9 U	18 U	11.8 U	50.3	37.7	22.8	19.4 U
Zinc	-	µg/L	20 U	20 U	20 U	29.4	20 U	20 U	20 U	20 U	20 U
Miscellaneous											
Nitrate (NO ³) (EPA 300.0)	45 ^c	mg/L	1.33	1.32	NA	3.23	NA	1.14	NA	5.52	NA
Radionuclides											
Americium 241 (ASTM D3972)	-	pCi/L	NA	NA	0.026	NA	0.016	NA	0.018	NA	0.012
Thorium 228 (ASTM D3972)	-	pCi/L	NA	NA	0.056 U	NA	0.097 U	NA	0.04 U	NA	0.027 U
Thorium 230 (ASTM D3972)	-	pCi/L	NA	NA	0.119 U	NA	0.13 U	NA	0.114 U	NA	0.144 U
Thorium 232 (ASTM D3972)	-	pCi/L	NA	NA	0.008 U	NA	0.015 U	NA	0.011 U	NA	0.057 U
Total Uranium (ASTM D3972)	20 ^{a,c}	pCi/L	NA	NA	47.4	NA	31.63	NA	50.02	NA	56.01
Lead 210 (ASTM D5811M)	-	pCi/L	NA	NA	0.49 J	NA	0.45 J	NA	0.51 J	NA	0.93 J
Total (Radium 226) (EPA 903.0)	5 ^{b,c}	pCi/L	NA	NA	0.09	NA	0.1	NA	0.02	NA	0.35
Gross Alpha (EPA 9310)	15 ^c	pCi/L	34.6	35.3	27.6	23.5	28.3	35.5	35.7	50	45.9
Gross Beta (EPA 9310)	50 ^c	pCi/L	11.4	11.5	21.8	34.7	22.7	12.8	30	20.5	34.8
Radium 228 (EPA 904.0)	5 ^b	pCi/L	NA	NA	0.66	NA	0.29	NA	-0.01	NA	0.13

Notes:
µg/L = micrograms per liter
mg/L = milligram per liter
pCi/L = picocuries per liter
AA3 = Anomaly Area 3
NA = not analyzed

U = indicates the analyte was not detected at or above the stated limit.
J = indicates an estimated value.
MCL = maximum contaminant level
- = Regulatory Threshold Concentrations not established for this particular analyte.

^a The regulatroy threshold limit is for total of uranium constituents.

^b The regulatory threshold limit is for total radium constituents.

^c Value represents the stringent concentration of Federal and California MCLs.

^d Value represents the secondary MCL.

Values in **bold** indicate that the particular analyte had exceeded its regulatory threshold limit.

Table 6-21: Summary of Detected Analytes - Round 1 and Round 2 Groundwater Sampling - RSE Investigation

PARAMETER	Regulatory Threshold Concentrations (µg/L)	WELL ID:		AA3-MW01			AA3-MW02			AA3-MW03		AA3-MW04		AA3-MW05		AA3-MW06		AA3-MW07		AA3-MW08	
		EPA ID:		LK256	LK332	LK333	LK264	LK340	LK341	LK261	LK297	LK258	LK329	LK243	LK324	LK240	LK299	LK237	LK325	LK255	LK337
		SAMPLE DATE:		12/3/2002	4/1/2003	4/1/2003	12/4/2002	4/2/2003	4/2/2003	12/4/2002	3/19/2003	12/3/2002	3/28/2003	11/27/2002	3/27/2003	11/26/2002	3/20/2003	11/26/2002	3/27/2003	12/3/2002	4/2/2003
		SAMPLE TYPE:		Regular	Regular	Duplicate	Regular	Regular	Duplicate	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular
VOCs		Units	Method																		
4-METHYL-2-PENTANONE (MIBK)	-	ug/L	8260B	50U	50U	50U	50U	50U	2J	50U	50U	50U	50U	50U	50U	50U	0.5J	50U	50U	50U	50U
CHLOROFORM	100 ^b	ug/L	8260B	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.61	0.1U
SVOCs																					
3/4-METHYLPHENOL (M/P-CRESOL)	180 ^d	ug/L	8270C	9.6U	9.6U	9.6U	6J	9.6U	9.6U	9.6U	10U	9.6U	9.6U	9.6U	9.6U	9.6U	10U	10U	9.6U	9.6U	9.6U
BIS(2-ETHYLHEXYL)PHTHALATE	-	ug/L	8270C	9.6UJ	9.6U	9.6U	9.6UJ	9.6U	2J	9.6UJ	10U	9.6UJ	9.6U	9.6UJ	9.6U	9.6UJ	10U	10UJ	9.6U	9.6UJ	9.6U
BUTYLBENZYLPHTHALATE	-	ug/L	8270C	9.6UJ	9.6U	9.6U	9.6UJ	9.6U	9.6U	9.6UJ	10U	9.6U	0.7J	9.6UJ	9.6U	9.6UJ	10U	10UJ	9.6U	9.6U	9.6U
DIETHYLPHTHALATE	29000 ^d	ug/L	8270C	2J	9.6U	9.6U	9.6U	9.6U	9.6U	9.6U	10U	9.6U	9.6U	9.6U	9.6U	9.6U	10U	10U	9.6U	2J	9.6U
PHENOL	22000 ^d	ug/L	8270C	9.6U	9.6U	9.6U	12	9.6U	9.6U	9.6U	10U	9.6U	9.6U	9.6U	9.6U	9.6U	10U	10U	9.6U	9.6U	9.6U
METALS																					
ALUMINUM	1000 ^b	ug/L	6010B	13.1	22.5UJ	8.2UJ	315	25.7UJ	20.3UJ	18.4J	200U	31.4	36.6	120J	141	101J	53.5UJ	302	169	287	82UJ
ANTIMONY	6 ^b	ug/L	6010B	4.4UJ	3.8	60U	4.2UJ	60U	2.7	60U	60U	3.2UJ	60U	60U	60U	60U	60U	60U	60U	2.8UJ	2.9
ARSENIC	50 ^b	ug/L	6010B	8.4UJ	5.3	3.7	12UJ	11.1	13.4	5.9UJ	7.2UJ	19.1	22.8	7.8UJ	7.8	2.4	12.4UJ	3.6	8	4.7UJ	10U
BARIUM	1000 ^b	ug/L	6010B	45.6	36.8	36.1	48.4	44.1	43.1	23.9	21.6	30.3	30	23.2	24.3	24.1	29.8	52.7	53.3	39.5	18.6
CALCIUM	-	ug/L	6010B	170000	134000	131000	183000	177000	173000	180000	173000	191000	192000	129000	134000	205000	225000	243000	238000	96800	92000
CHROMIUM	50 ^b	ug/L	6010B	27.4	203	120	296	15.4	11.4	5.2	0.68UJ	20.1	4.7	2UJ	4.6	1.8	3.8UJ	11	4	5.3	3.3
COPPER	1300 ^a	ug/L	6010B	5.9UJ	7.4	3.2	47.2	8.5	5	5UJ	2	15.2	6.1	2.7UJ	4.8	2.2UJ	3.2UJ	6.7UJ	7.8	6.6	3.3
IRON	300 ^c	ug/L	6010B	475	992	613	3430	3660	3150	38.9UJ	100U	258	430	181	199	79.1UJ	54.2UJ	430	244	381	92.9
LEAD	15 ^a	ug/L	6010B	3.1UJ	3U	3U	2.9UJ	3U	3U	3.8	3U	3.3UJ	3UJ	3U	3UJ	3U	3U	0.84J	3UJ	2.3UJ	3U
MAGNESIUM	-	ug/L	6010B	83600	68000	67600	94500	96100	95000	83000	83000	110000	112000	69700	73600	98300	106000	99900	104000	52400	49500
MANGANESE	50 ^c	ug/L	6010B	19.6	7.5	5.2	829	799	768	12.9J	7.6	59.7	53.3	60.5	11.5	24	30.7	71.5	54.2	145	160
MERCURY	2 ^b	ug/L	7470A	0.18	0.15UJ	0.12UJ	0.2U	0.33	0.15UJ	0.037J	0.067	0.098	0.15	0.021	0.18	0.2U	0.2	0.027J	0.17	0.12	0.18
NICKEL	100 ^b	ug/L	6010B	105	55.3J	40.8J	54.2	19.3J	6.9J	4.8UJ	6.1UJ	31.1	23.3UJ	4.9UJ	2.8UJ	2.9UJ	3.6UJ	12.6J	9.7UJ	5.2UJ	1.9UJ
POTASSIUM	-	ug/L	6010B	3410	2670J	2570J	5670	8690J	8020J	5750	6620	3100	3300	7810	5260	5350	5540J	5800	3800	11100	5120J
SELENIUM	50 ^b	ug/L	6010B	14.3	11.8	13.4	15.3	5.7	8	35.8	49.9	12.4	19.2	21.6	27.6	26	28.2	33.2	32.8	4.8J	5U
SILVER	100 ^c	ug/L	6010B	1.2	2.3UJ	2.5UJ	0.4	2.7UJ	3UJ	1	2.6UJ	0.53	2UJ	10U	1.9UJ	10U	10UJ	10U	2.8UJ	10U	1.5UJ
SODIUM	-	ug/L	6010B	451000	357000	359000	413000	399000	397000	303000	302000	386000	389000	464000	413000	358000	406000	371000	361000	364000	369000
THALLIUM	5 ^b	ug/L	6010B	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	8UJ	10U	6.6UJ	5.7	6.8UJ	10U	10U	10U
VANADIUM	-	ug/L	6010B	25.2	22.6	22.3	8	0.98UJ	0.8UJ	15.8	14.2	43.6	37.1	19.7	21.3	17.2	18.9	18.3	20.3	5.7	1.9UJ
ZINC	5000 ^c	ug/L	6010B	48	6.6	6.6	26.4	6.6	115	20J	20U	20.9	11.8	9UJ	40.8	11.2UJ	5.9UJ	48.3J	40.8	19.8	36.6
PETROLEUM HYDROCARBONS																					
MOTOR OILS	-	mg/L	8015B DRO	0.096U	0.096U	0.096U	0.37	0.096U	0.08J	0.096U	0.13U	0.096U	0.13U	100U	0.14U	0.096U	0.13U	0.096U	0.14U	0.096U	0.096U
PRC AS DIESEL FUEL	-	mg/L	8015B DRO	0.096U	0.096U	0.096U	1.3	0.096U	0.02J	0.096U	0.096U	0.096U	0.096U	0.096U	0.1U	0.096U	0.096U	0.096U	0.1U	0.008J	0.096U

Table 6-21: Summary of Detected Analytes - Round 1 and Round 2 Groundwat

PARAMETER	Regulatory Threshold Concentrations (µg/L)	WELL ID:		AA3-MW09A			AA3-MW09B		AA3-MW10	
		EPA ID:		LK338	LK246	LK319	LK249	LK320	LK252	LK301
		SAMPLE DATE:		4/2/2003	11/27/2002	3/26/2003	11/27/2002	3/26/2003	12/2/2002	3/20/2003
		SAMPLE TYPE:		Duplicate	Regular	Regular	Regular	Regular	Regular	Regular
VOCs		Units	Method							
4-METHYL-2-PENTANONE (MIBK)	-	ug/L	8260B	50U	50U	50U	50U	50U	50U	0.3J
CHLOROFORM	100 ^b	ug/L	8260B	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
SVOCs										
3/4-METHYLPHENOL (M/P-CRESOL)	180 ^d	ug/L	8270C	9.6U	9.6U	9.6U	9.6U	9.6U	9.6U	10U
BIS(2-ETHYLHEXYL)PHTHALATE	-	ug/L	8270C	9.6U	9.6UJ	9.6U	9.6UJ	9.6U	9.6UJ	10U
BUTYLBENZYLPHTHALATE	-	ug/L	8270C	9.6U	9.6UJ	9.6U	9.6UJ	9.6U	9.6U	10U
DIETHYLPHTHALATE	29000 ^d	ug/L	8270C	9.6U	9.6U	9.6U	9.6U	9.6U	9.6U	10U
PHENOL	22000 ^d	ug/L	8270C	9.6U	9.6U	9.6U	9.6U	9.6U	9.6U	10U
METALS										
ALUMINUM	1000 ^b	ug/L	6010B	70.3UJ	195	297	204	156	23.7J	14UJ
ANTIMONY	6 ^b	ug/L	6010B	60U	60U	60U	60U	60U	2.4UJ	60U
ARSENIC	50 ^b	ug/L	6010B	4.9	9.9UJ	7.4J	7.9UJ	4.6	5.7UJ	9.1UJ
BARIUM	1000 ^b	ug/L	6010B	18.5	50.1	60.4	36.4	29.8	40	38.3
CALCIUM	-	ug/L	6010B	91900	116000	116000	114000	118000	167000	209000
CHROMIUM	50 ^b	ug/L	6010B	3	1.9UJ	2UJ	3.1UJ	2.6UJ	2.8J	3.1UJ
COPPER	1300 ^a	ug/L	6010B	1.9	4.2UJ	1.7	2.6UJ	25U	4.9UJ	25UJ
IRON	300 ^c	ug/L	6010B	178	263	384	545	439	28.5UJ	193
LEAD	15 ^a	ug/L	6010B	3U	0.92UJ	3U	1.4UJ	3U	3.3UJ	3U
MAGNESIUM	-	ug/L	6010B	50000	42500	42400	62500	64000	87200	99500
MANGANESE	50 ^c	ug/L	6010B	164	20.5	7.1	8.9	6.1	35.5	14.7
MERCURY	2 ^b	ug/L	7470A	0.12UJ	0.05J	0.2	0.038J	0.19	0.11J	0.2
NICKEL	100 ^b	ug/L	6010B	1.6UJ	3.8UJ	2	5.1UJ	2.4	3UJ	1.6UJ
POTASSIUM	-	ug/L	6010B	5090J	4190	3770J	3520	3020J	5650	6520J
SELENIUM	50 ^b	ug/L	6010B	3.8	13.3	14.6UJ	7.5J	7.9UJ	5UJ	3.4UJ
SILVER	100 ^c	ug/L	6010B	0.98UJ	10U	10U	10U	10U	1.2	10UJ
SODIUM	-	ug/L	6010B	369000	329000	336000J	413000	406000J	421000	507000
THALLIUM	5 ^b	ug/L	6010B	10U	7.1UJ	10UJ	9.5UJ	1.6J	10U	3J
VANADIUM	-	ug/L	6010B	1.9UJ	33.9	32.9	15.4	14.7	1.5UJ	50U
ZINC	5000 ^c	ug/L	6010B	6.8	10.3UJ	9.3	11.4UJ	8.9	201	3.6UJ
PETROLEUM HYDROCARBONS										
MOTOR OILS	-	mg/L	8015B DRO	0.096U	100U	0.14U	100U	0.14U	0.096U	0.13U
PHC AS DIESEL FUEL	-	mg/L	8015B DRO	0.096U	0.096U	0.1U	0.096U	0.1U	0.096U	0.096U

NOTES:

µg/L = micrograms per liter

mg/L = milligram per liter

TPH = total petroleum hydrocarbons

VOCs = volatile organic compounds

SVOCs = semivolatile organic compounds

AA3 = Anomaly Area 3

RSE = Removal Site Evaluation

U = indicates the analyte was not detected at or above the stated limit.

UJ = indicates the analyte was not detected at or above the stated limit. The sample detection limit is an estimated value.

J = indicates an estimated value.

MCL = maximum contaminant level

AL = action level

PRGs = Preliminary Remediation Goals

Prior to sampling monitoring well MW02, a dead animal carcass was removed from the well.

^a Value represents the AL for the analyte.

^b Value represents the stringent concentration of Federal and California MCLs.

^c Value represents the secondary MCL.

^d Value represents the tap water PRGs.

- = Regulatory Threshold Concentrations not established for this particular analyte.

Values in bold indicate that the particular analyte had exceeded its regulatory threshold limit.

Table 6-22: Statistics of Detected Analytes – Groundwater Sampling – Previous Sampling Events, Round 1 and Round 2 Sampling – RSE Investigation

Analyte	Number of Samples Analyzed ^a	Number of Detections	Minimum and Maximum Concentrations (µg/L)	Frequency of Detection (%)	Detections Above MCLs
MTBE	34	2	2.5J and 2.6J	6	—
MIBK	34	3	0.3J – 2J	9	—
Chloroform	34	1	0.61	3	—
m/p-cresol	34	1	6J	3	—
bis(2-ethylhexyl)phthalate	34	1	2J	3	—
Butylbenzylphthalate	34	1	0.7J	3	—
Diethylphthalate	34	2	both 2J	6	—
Phenol	34	1	12	3	—
Chromium (mg/L)	34	10	1.8 - 357	30	2
Nickel (mg/L)	34	4	12.6J - 105	12	1
Selenium (mg/L)	34	15	4.8J - 50.3	44	1
Motor oils (mg/L)	34	1	0.37	3	—
PHC as diesel fuel (mg/L)	34	2	0.008J and 1.3	6	—

Notes: ^a Number of samples analyzed for the specified analyte, including duplicates, if any.

6.6 SEDIMENT

Sediment sampling was proposed at AA 3 in response to decision question #4 and in accordance to decision rule #5 of the RSE investigation. Four sediment samples were collected from the upstream and downstream locations to assess the impact of debris on the sediment of Agua Chinon Wash.

Four sediment samples (at upstream, mid, and downstream locations) were collected on 23 February 2003 (Table 1 of Appendix J). Any impact to the Agua Chinon wash sediments were determined by comparing the upstream sediment analyte concentrations with the downstream analyte concentrations, as well as by comparing the sediment analyte concentrations with the analyte concentrations detected from surface soil samples collected from within the debris placement boundaries. A complete data set for the sediment samples is presented in Table 2 of Appendix J. Table 6-23 presents the detected results of the sediment samples. Sediment sampling locations are presented on Figure 4-1.

Out of the complete suite of analysis, only two metals, arsenic (3 samples out of 4) and vanadium (all 4 samples) exceeded the residential PRGs; however, the detected concentrations were lower than background concentrations. Of the organics only motor oil was detected in one of the four samples collected and analyzed in the laboratory (at a low concentration of 20 mg/kg). The highest concentration of arsenic, vanadium and motor oils was detected from the upstream sediment sample SD1. Surface soil samples (Section 6.4.1) did not have arsenic and vanadium concentrations exceeding their respective residential PRG concentrations. Even though the surface soils collected from AA 3 had detected concentrations of motor oils, it is unlikely that AA 3 is the source, since the upstream sediment sample had the only detected motor oil concentration compared to the other samples, which were non-detect. Based on these results of the sediment sampling, AA 3 does not impact sediments of Agua Chinon Wash.

6.7 SURFACE WATER SAMPLING

Surface water sampling was proposed at AA 3 in response to decision question #4 and in accordance to decision rule #5 of RSE investigation. Two surface water samples were collected from the upstream and downstream locations to assess the impact of debris on the surface water of the Agua Chinon Wash (Table K-1 of Appendix K).

The proposed sampling locations for surface water runoff were designed to evaluate analyte concentrations in surface water at the upstream and at a downstream location within Agua Chinon wash. Samples were analyzed for the full suite of analyses (petroleum hydrocarbons, VOCs, SVOCs, metals, and perchlorate) similar to groundwater samples. These surface water sample results were evaluated based on comparison with the groundwater quality criteria. A complete data set is presented in Table K-2 of Appendix K. Table 6-24 presents the detected results of the surface water samples. The sampling locations are presented on Figure 4-1.

Of the complete suite of analyses conducted on these surface water samples, only two metals, aluminum and chromium, were detected at concentrations exceeding their respective MCL concentrations. However, as can be noted in Table 6-24, the upstream and downstream concentrations of these constituents are closely similar, indicating that AA 3 does not impact surface water in Agua Chinon Wash.

Table 6-23: Summary of Detected Analytes – Sediment – RSE Investigation

Analyte	PRGs		Background (95 percentile)	Well ID:	LK289	LK290	LK291	LK292
				EPA ID:	AA3-SD1	AA3-SD2	AA3-SD3	AA3-SD4
	Residential	Industrial		Sample Date:	2/23/2003	2/23/2003	2/23/2003	2/23/2003
				Sample Type:	Regular	Regular	Regular	Regular
Metals (EPA Method 6010B)				Units				
Aluminum	76,000	100,000	14,800	mg/kg	3,050	2,420	2,120	1,750
Arsenic	0.39	1.6	6.86	mg/kg	1.8	1.4	0.94UJ	1.4
Barium	5,400	67,000	173	mg/kg	85.7	39.6	25.6	110
Cadmium	1.7	7.4	2.35	mg/kg	0.26	0.17UJ	0.16UJ	0.23
Calcium	—	—	46,000	mg/kg	4,570	3250	2,620	3,020
Chromium	211	448	26.9	mg/kg	4.4	2.8	2.7	2.5
Cobalt	903	1,921	6.98	mg/kg	2	1.6	1.2	1.4
Copper	3,129	40,877	10.5	mg/kg	2.5	1.8	1.5	1.3
Iron	23,463	100,000	18,400	mg/kg	5,050	3,830	2,700	2,890
Lead	150	750	15.1	mg/kg	1.9	1.2	1	1.5
Magnesium	—	—	8,370	mg/kg	1,610	1,330	1,030	898
Manganese	1,762	19,458	291	mg/kg	120	82.8	54.6	130
Mercury (EPA Method 7471A)	23.5	307	0.22	mg/kg	0.24U	0.22U	0.22U	0.006
Nickel	1,564	20,439	15.3	mg/kg	2.8	1.8	2.1	1.6
Potassium	—	—	4,890	mg/kg	821	699	418	422
Selenium	391	5,110	0.32	mg/kg	0.36U	0.34U	0.33U	0.17
Sodium	76,000	100,000	14,800	mg/kg	120U	23.1	47.7	110U
Vanadium	0.39	1.6	71.8	mg/kg	13.9	9.4	7.5	7.9
Zinc	5,400	67,000	173	mg/kg	13.5	9.9	7.6	7.3
Petroleum Hydrocarbons (EPA Method 8015B DRO)								
Motor Oils	—	—	—	mg/kg	20	11U	11U	11U

NOTES:

U = indicates the analyte was not detected at or above the stated limit.

UJ = indicates the analyte was not detected at or above the stated limit. The sample detection limit is an estimated value.

J = indicates an estimated value.

For metals, values in **bold** indicate that the particular analyte has concentrations exceeding both the residential and industrial PRGs; however, their values are below the former MCAS El Toro background concentrations (BNI 1996).

Table 6-24: Summary of Detected Analytes – Surface Water – RSE Investigation

Analyte	Regulatory Threshold Concentrations (µg/L)	Well ID:	LK286	LK287
		EPA ID:	AA3-UGSW	AA3-DGSW
		Sample Date:	2/25/2003	2/25/2003
		Sample Type:	Regular	Regular
Metals (EPA Method 6010B)		Units		
Aluminum	1,000 ^b	µg/L	87,500	86,400
Arsenic	50 ^b	µg/L	33.8	34.2
Barium	1,000 ^b	µg/L	867	871
Beryllium	4 ^b	µg/L	2.7	2.7
Cadmium	10 ^b	µg/L	6	6.4
Calcium	-	µg/L	109,000	115,000
Chromium	50 ^b	µg/L	80.2	83.5
Cobalt	-	µg/L	30.8	31.5
Iron	300 ^c	µg/L	70,300	71,900
Lead	15 ^a	µg/L	26.7	28.2
Magnesium	-	µg/L	49,300	50,400
Manganese	50 ^c	µg/L	1,070	1,070
Nickel	100 ^b	µg/L	75.5	78.5
Potassium	-	µg/L	18,000	19,300
Sodium	-	µg/L	79,700	79,000
Vanadium	-	µg/L	222	227
Zinc	5,000 ^c	µg/L	242	286

NOTES:

^a Value represents the AL for the analyte.^b Value represents the stringent concentration of Federal and California MCLs.^c Value represents the secondary MCL.^d Value represents the tap water PRGs.

- = Regulatory Threshold Concentrations not established for this particular analyte.

Values in **bold** indicate that the particular analyte had exceeded its MCL regulatory threshold limit.

Map 4

Well MW03	Sample ID:	20242-989	20242-1120	LK261	LK297
	Sample Date:	11/03/95	04/18/96	12/4/2002	3/19/2003
	Chromium	mg/L	50.3	37.7	5.2
	Total Uranium	pCi/L	NA	50.02	NA
Gross Alpha	pCi/L	35.5	35.7	NA	NA

Well MW02	Sample ID:	20242-984	20242-1124	LK264	LK340/LK341
	Sample Date:	11/02/95	04/19/96	12/4/2002	4/2/2003
	MIBK	ug/L	50U	50U	2.0 J
	Bis (2-ethylhexyl) phthalate	ug/L	NA	NA	9.6 UJ
3/4-Methylphenol	ug/L	NA	NA	6J	9.6 U
	Phenol	ug/L	NA	12	9.6 U
Motor Oils	mg/L	NA	NA	0.37	0.08 J
	PHC as diesel fuel	mg/L	0.095U	0.095U	1.3
Chromium	mg/L	50U	357	296	0.02 J
	Manganese	mg/L	259	443	15.4
Total Uranium	pCi/L	NA	15.43	NA	NA
	Gross Alpha	pCi/L	23.5	28.3	NA

Well MW06	Sample ID:	LK240	LK299
	Sample Date:	11/26/2002	3/20/2003
MIBK	ug/L	50.0 U	0.5 J

Well MW04	Sample ID:	20242-981	20242-1122	LK258	LK329
	Sample Date:	11/01/95	04/19/96	12/3/2002	3/28/2003
	Total Uranium	pCi/L	NA	56.01	NA
	Gross Alpha	pCi/L	50	45.9	NA
Butylbenzylphthalate	ug/L	NA	NA	9.6 U	0.7 J

Well MW10	Sample ID:	LK252	LK301
	Sample Date:	12/2/2002	3/20/2002
MIBK	ug/L	50.0 U	0.3 J

Well MW08	Sample ID:	LK377	LK237/LK338
	Sample Date:	12/3/2002	4/2/2003
	PHC as diesel fuel	mg/L	0.008J
	Diethylphthalate	ug/L	2J
Chloroform	ug/L	0.61	0.1 U

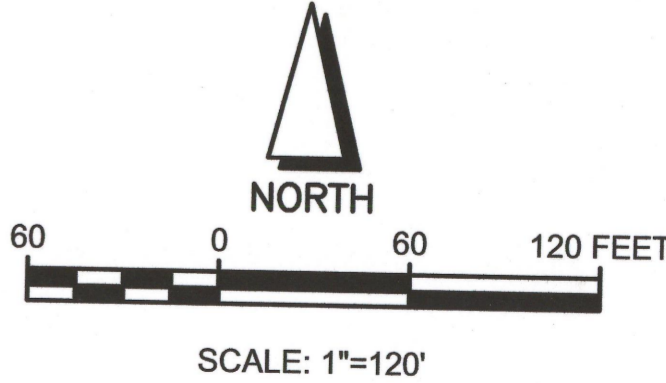
Well MW01	Sample ID:	20242-987	20242-1123	LK256	LK332/LK333
	Sample Date:	11/02/95	04/19/96	12/3/2002	4/1/2003
	MTBE	ug/L	2.6J	10U	3U
	Diethylphthalate	ug/L	NA	NA	2J
Nickel	mg/L	150U	150U	105	55.3 J
	Total Uranium	pCi/L	NA	38.4	NA
Gross Alpha	pCi/L	34.6	27.6	NA	NA
	Manganese	mg/L	80.2	20 U	19.6

LEGEND

- MINOR SURFACE ELEVATION: 2-FOOT INTERVALS
- MAJOR SURFACE ELEVATION: 10-FOOT INTERVALS
- MCAS EL TORO BOUNDARY
- EXISTING STREAM OR WASH
- PREVIOUSLY ESTIMATED EXTENT OF WASTE PLACEMENT BEFORE RSE INVESTIGATION (EARTH TECH 2001)
- REVISED EXTENT OF WASTE PLACEMENT BASED ON TRENCHING ACTIVITY (MARCH 2000 AND OCTOBER 2002)
- RSE GROUNDWATER MONITORING WELL LOCATION
- EXISTING GROUNDWATER MONITORING WELL LOCATION
- NA NOT ANALYZED
- U ANALYTE WAS NOT DETECTED AT OR ABOVE THE STATED LIMIT
- UJ ANALYTE WAS NOT DETECTED AT OR ABOVE THE STATED LIMIT. THE SAMPLE DETECTION LIMIT IS AN ESTIMATED VALUE
- MIBK 4-METHYL-2-PENTANONE
- GROUNDWATER GRADIENT DIRECTION - DECEMBER 2002

NOTES

- TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHOD FROM AERIAL PHOTOGRAPHY DATED DECEMBER 2001 BY SAN-LO AERIAL SURVEYS.
- COORDINATES ARE IN CALIFORNIA STATE PLANE COORDINATE SYSTEM, NAD 83, ZONE 6.
- ELEVATIONS IN FEET; BENCHMARK BASED ON NORTH AMERICAN VERTICAL DATUM 1988.
- RED INDICATES THAT THE PARTICULAR ANALYTE CONCENTRATIONS HAVE EXCEEDED THEIR RESPECTIVE MCL CONCENTRATION.



ESI Report

Draft

Detected Groundwater Sampling Results - All Sampling Events

Removal Site Evaluation for Anomaly Area 3

Date: 11-03

Project No. 37380

MCAS El Toro

EARTH TECH

A tyco INTERNATIONAL LTD. COMPANY

Figure 6-11